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ABSTRACT

This thesis investigates the impact of computer Braille on blind professionals in terms of their need for, the availability of, and the cost of production of Braille transcriptions of serials. Related problems of an economic, legal, and educational nature are discussed as they impinge on the area of investigation. The thesis is in three parts: feasibility study, implications for librarianship, and documentation for the demonstration. The study concluded large scale serial translation is not feasible at present for an individual library. A preferable method is production of Braille "masters" from which copies can be made for the user. Cost is prohibitive because of present minimal demand for this type of product. Recommendations are made for further research, including a reader study and the set-up of a prototype Braille translation service for a sample group of prospective users. Tables and references are included. (Author/JAB)

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QUEENS COLLEGE DEPARTMENT OF LIBRARY SCIENCE

COMPUTER BRAILLE TRANSLATION OF SERIALS: A DEMONSTRATION,

FEASIBILITY STUDY,

and

IMPLICATIONS FOR LIBRARIANSHIP

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

MOSHE MICHEL

Thesis, submitted in partial fulfillment of the requirements for the degree Master of Science in Library Science, to the Faculty of the Department of Library Science, Queens College of the City University of New York, December, 1976.

Miles A. Libbey — 12/20/76
Approved — Date

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PREFACE

INTRODUCTION

The work described in this thesis is an outgrowth of work done at the Sensory Aids Evaluation and Development Center of MIT, during the period from roughly 1964 to 1971, which culminated in the development of the DOTSYS Braille Translation Program. An account of this work appeared in the New York Times for the first of February, 1972.[1]

With only the Times article in hand, the investigator developed and implemented a Braille Translation program for the Hebrew Language, in the Spring Semester of 1974 as a Project for a course entitled "CIS 60.1 Independent Project I" which is included as a part of the demonstration, which is a separately documented part of the thesis.

A visit to the local branch of the Library of Congress system serving the Blind and Physically Handicapped, convinced the investigator that the blind should benefit from the information explosion and computer technology was the tool that could have a decisive impact in providing the blind with their information needs, enabling them to benefit from the large amount of material that the sighted were obtaining as a matter of course from their public and academic libraries.

An attempt, since abandoned, to implement a full-scale braille translator for several languages, using the DOTSYS program, was then attempted. The linguistic skills (not to mention a knowledge of the foreign languages and their braille codes), and the time required for the linguistic analysis, precluded the completion of multilingual tables for DOTSYS. However, information obtained while the investigator was in Europe that relates to the [illegible] of braille, is included in the present study.

The investigator had the fortune to take one of the required bibliography courses with an instructor who was also a scientist, and there learned the patterns of information usage in the scientific community. In addition, some rudimentary knowledge of serials librarianship was also acquired at the same time.

This, then became the focus that the present study took. To attack the problem, it has to be broken down into distinct parts. There are three sections to the present study. The first part, a demonstration of Braille translation, contains DOTSYS, a suite of programs to provide operator communication and computer system and program interface, an interactive CAI-type program that instructs the user in the rudiments of editing text destined to be translated by DOTSYS, the aforementioned Hebrew Braille translator, included in its entirety, a program providing the requirements of catalog access, author, title, subject, author-title, and shelflist maintenance capabilities providing bibliographical control over the translated text, programs that provide dynamic compilation of DOTSYS or its execution if already in an executable state, a logon procedure which gives some control over the users of the system as well as providing security to the bibliographic data base, and suitable documentation for modification, and maintenance and use of these program elements round out the system. DOTSYS documentation is cited in the text of the thesis proper, but is not included. All investigator-written programs, with the exception of the Hebrew Language translation program, and the assembler-language linkages, are coded following the latest top-down structured programming methodology. All programs are documented in accordance with existing practice, following the guidelines in an established text.[2] The DOTSYS documentation is extensive; relevant parts are cited in the bibliography.[3]

The feasibility study, the second part of the project, is an analysis of a proposed Braille translation and delivery system, such as might be used to communicate between a central site and remote stations, and which would provide the capability to translate text into Braille, and deliver it to the requesting location. The system proposed is a sample and does not correspond with the system used to develop the demonstration. The cost of preparing text for translation, and translation and delivery, is contrasted both with the means of providing Braille serials to readers in the system of libraries coordinated by DBPH, and with a large multi-library campus of the City University. Other sources besides Braille are considered, in view of the size of the Braille reading population, and as a comparison. However, they are not strictly speaking a part of this study.

The third part of the study concerns itself with the implications for the library profession. Who the blind are, what their reading needs are professionally, what is available in Braille, problems of availibility and distribution, impact of the computer and problems of computer Braille round out the main part of the text. An appendix and necessary bibliographical references conclude the work.

METHODOLOGY

A literature search was conducted, focusing on current material, published within the last ten years or so, and concentrating on materials published in English. Standard abstracting sources were searched in both the library field and computer science. Because of the developing nature of the field, at least as far as the library is concerned, emphasis is on current sources including journals and conference proceedings, and actual contact with people in the field, including developers of computer Braille, users or potential users of Braille, and workers in the rehabilitation and library fields who work with the blind.

The translation of material into Braille in several languages is well-documented. The Danes and Swedes have changed their Braille codes in anticipation of computer Braille. Several groups in various countries, notably France, Sweden, Denmark, and the Netherlands, are involved in various phases of Braille translation research. However, there has been no study of the use of or availability of professional journals for the blind, as confirmed in all countries visited by this investigator in the course of his research. The libraries for the blind have not kept pace with the knowledge explosion, even though the blind are breaking down the barriers. The time to get a work cleared is lengthy, and in the case of serials, prohibitive. This then, is an attempt to apply the current technology, and is reason to pursue the matter further, the first step being a consideration of the costs and benefits involved, and indirectly an indication as to the fitness of the library profession to come to grips with the problems involved. By far, the most important influence on the study has been the work of Goldish. His data and conclusions have formed a basis for the cost-benefit analysis section of the present study, however, they are not used in the form in which he presented them; new data has been gathered by the investigator for the purpose at hand. The types of research mentioned by Goldish indicate the direction to be taken in Braille research, and the work presented here is a modest attempt at making more available in Braille, hopefully cheaper.

The problem of adequate statistics, of the absolute number of the blind, of the professionally trained or employed, and the Braille users in that group, have been noted by others, inclusing Goldish, and later Prentiss, whose comments are noted infra. The investigator had no idea of how intractable the situation really is, until he was conducting the last few field interviews. As far as the present study is concerned, the conclusions are not affected qualitatively by the lack of statistics; however, further information is needed as the recommendations and text will show. The investigator has made diligent efforts to obtain for the purpose of the study and as a basis for prediction, current evidence of the type described, and any further work in the direction proposed by the current study is going to need more detailed and complete data than is now available.

The investigator has relied on interviews, and actual records used in the field as his primary sources. Secondary sources, except for statistical information, have been included more by their presence as a guide while doing the analysis rather than appearing in the text as quotes. However, all of this material is cited in the bibliography. Statistical methods have been used where appropriate. Additionally, legal and cost accounting texts and references have made the task a bit easier to manage. Any oversights in these areas are the investigator's and not the responsibility of those who supplied the information.

ASSUMPTIONS AND PROBLEMS

There are two different kinds of assumptions involved in the present study. The first kind has to do with the characteristics of the blind themselves, while the second concerns itself with the reading material and its production.

The following is assumed about the blind. It is primarily an old age affliction, although there are congenitally blind people in all societies. The age distribution and percentage of blind people who use Braille is likewise similar. The actual number of people in the various groups is dependent on the individual country concerned. The blind go into the same professions and occupations as their sighted counterparts, in roughly the same proportions.

The following is assumed about Braille serials production in particular. Computer production of Braille is technologically feasible, per se, although the economic feasibility is not known at the present time. It is also expensive, the exact amount of the expense, and the elements of the translation process that are most costly still not precisely defined. The Braille code is not going to be changed in the forseeable future. Last, the existing apparatus of Braille production, at least in the U. S., is going to be an obstacle to the change of the Braille production system, as far as large scale implementation of computer Braille is concerned.

Given the preceding list of constraints and assumptions, it is possible to attempt to define the costs of implementing a library oriented Braille translation system, including costs of data preparation, translation itself, identifying possible areas of infeasibility, and proposing alternatives. Second, to attempt to define in a quantitative fashion, the distribution of professionally-trained blind persons, in order to try to determine their needs; and lacking the information to do this, to identify the areas in which more information is needed, and to suggest a possible means of obtaining this information. Third, to explore what is available in Braille concentrating on quantity of readers and type of material by subject. Serials only are being considered. Fourth, to identify problems that have a crucial bearing on the production of timely and current professional literature using a computer-based system for translation. Fifth, to consider the impact of current Braille translation technology and the problem areas that will make financing difficult. And sixth, in light of the dynamic nature of serials librarianship, to consider the impact of the following areas on the proposed system: availability of retrospective as opposed to current material, type of material 'mix', i.e., serials or abstracts or some combination of both dependent on the information needs of the prospective users, and a suggestion of the type of indexing needed to assure bibliographic access. Seventh, to suggest the possible types of network organization, and alternate means of distribution, and consideration as to the funding agent. Some of these may use interrelated information, for instance, questions of type and quantity of material desired can be obtained by use of the same instrument that inquires as to professional characteristics, or, the question of custody of compositor's tapes being related to representation on a network of translation centers or a translation center governing body. Recommendations will consider action to be taken on the basis of conclusions of analysis of the evidence at hand, and also suggest further investigations or information needed prior to making a definite decision to proceed further.

In a project of the current size, it is impossible to singlehandedly obtain all of the information that is required. The investigator therefore wishes to acknowledge the assistance of the following individuals and organizations, who willingly gave of their time, experience, and information.

The U. S. copyright office for information on copyright and a copy of the revised copyright law, Bill S22; Alfred Hagle, D. Kimmee, L. Redmond, and Richard Evenson of the Division for the Blind and Physically Handicapped of The Library of Congress, for information and interviews; Sally Campbell, Barbara Nugent, and Alar Kruus for information and interviews, and access to Library facilities and records; Sam Streit, Archives, Cohen Library, City College, for use of materials; Anthony Kostreba, Serials Division, Library of Congress for an interview: Bill Raider, National Braille Press, Boston, Mass., for an interview; Harry Friedman, Manager, Howe Press, Boston, Mass., for an interview; George Dalrymple, SAEDC, MIT, Cambridge, Mass., for an interview and DOTSYS tape; Richmond Marcy, and Mr. Davis, Counselors, State Board of Education for the Blind, Wethersville, Conn. for information and interview; the staffs of the following libraries: New York Public Library, Hartford Public Library,

Boston Public Library, Free Library of Philadelphia, Library of Congress, Cohen Library at City College, Paul Klapper Library at Queens College, CUNY, and the Library for the Blind and Physically Handicapped, New York Regional Branch, all for access to facilities and reference usage; Elaine Siegel, Librarian of Nigel Memorial Library, American Foundation for the Blind, for reference privileges; J. Beck, Volunteers for the Blind, Philadelphia, Pa., for an interview; Mike Coyle, Library for the Blind and Physically Handicapped, Free Library of Philadelphia, for an interview; E. Hatfield, National Society for the Prevention of Blindness, New York for statistics; Staff of Columbia University Libraries, for reference privileges; John Gill, University of Warwick, England, for an interview; Bob Gildea, MITRE Corp., for information; Pat Curran of the Board of Higher Education, New York, for information; Sales representative Silver of IBM, for statistics; Sales representative of New York Telephone, Brooklyn, N.Y., for information; U. S. Office of Education, for Higher Education General Information Survey questionnaire forms; Staffs of the Swedish Foundation for the Blind, Stockholm, The Danish Society for the Blind, Copenhagen, Denmark, and the Royal National Institute for the Blind, London, England, for interviews and information; Jascha Leavey, Recording for the Blind, New York, for an interview.

The investigator would also like to thank his thesis committee, Professors M. A. Libbey, and R. A. Colby, both of Queens College, for their direction and assistance in bringing this thesis to completion.

The investigator would like to thank collectively all those sources not named above, who contributed to this study.

All ommissions and other errors are solely the responsibility of the investigator.

December 1, 1976 Moshe Michel

Brooklyn, New York

I-1

FEASIBILITY STUDY

This section presents a feasibility study of a proposed Braille translation system. The data on the prices of components was provided by IBM, on the basis of a system consisting of the following components: a Model 145-12 CPU, printer, a tape drive, at least four disc drives, communications control (for connection to phone lines), operator's console, power unit, and printer control. Each disc unit has two spindles and its own control unit included. Prices are as described in Table 1-1.[4] Each remote station consists of a graphics console, a printer and control (modified for producing Braille), and connection to the telephone line. A "Braille strip" may be substituted for the printer. Prices for the remote station are listed in Table I-1. Table I-2 contains information on phone connections and prices.[5] Table 1-3 contains information on the 'Braille strip' and supplies.[6,7] These prices do not include rent for facilities, utilities or other expenses, however, maintenance is included in the price of phone equipment and the computer configuration, both of which are leased.

Actual costs of use vary, but generally they all include the following elements; cost of reading 1000 cards, cost of printing 1000 lines and 1000 pages, cost of I/O, actual cpu time used, each weighted by a region factor, plus additional costs for tape mounts and use. Table I-4 gives the rates used at City University of New York Computer Center, which can be considered representative.

The job was to translate a page of text using DOTSYS, cost of editing and data preparation is not included.[8] It is impossible to put an exact figure on the programming for this project, as the investigator did not have outside funding; the support programs took three man-months to program and debug, and there are about 5000 cards in the whole job, which took 100 hours to punch, so a reasonable estimate would be one fourth of 10,000 dollars for the programming, and one hundred hours at four dollars an hour for the keypunching. The cost of the tape copy of DOTSYS was $13.63 plus 96 cents for shipping. The total cost of $2915. is an imputed cost as no actual payment was made. In actuality, the programs would be part of a program library, that would belong to either the individual user, or be a shared library for the whole computer center, the cost then appearing as a charge for disc mounting and usage.

Of the costs of operating a Braille translation system of the type described in this study, one of the major costs, is that of putting serials or articles thereof into machine readable form. John Gill of the University of Warwick, who has been working with material the demand for which is not excessive suggests

> it is not economical to put text into machine readable form. If you have printers' tapes which are error free you're in business and can build up from there...9

Furthermore, Gill suggests that it would take about 44 hours to keyboard 100,000 words,[10] or 176 dollars for labor, plus overhead for the machine at .30¢ per hour, or $13.20, plus the cost of cards, counting five letters to the word, and costing cards at $35. per 10M, or $21.875, for a total cost of $211.08 approximately for every 100,000 words of text. Table I-5 gives a summary of approximate costs of data preparation per 100,000 words, average number of words/article and per issue determined for a sample of 32 journals, and a breakdown of the costs of preparing a printer's tape of 100,000 words.[11]

The developer of the DOTSYS program, J. E. Sullivan, has redesigned it for use in a minicomputer,[12,13] and details of that implementation appear in Table I-6.

Table I-7 is a summary table presenting an overall view of the costs for the proposed system, with either card or disc or compositor's tape as input, and using either the standard or mini-computer version of DOTSYS. Imputed costs, i.e., costs that are represented by donated materials and/or services are indicated. The investigator does not have the expertise that would enable him to determine the costs of running the central computer site, but they are to be added to the costs set down here.

Since conventional printing methods for Braille are not used in the proposed system, and since the system is planned for library use, two comparisons have to be made. Is it cheaper to produce than conventional printed Braille, and is it within the means of the library budget to supply this service? For ease in continuing the analysis, the questions can be restated in terms of costs as follows. What is the cost of producing a serial in Braille, for one reader? What is the cost of providing a reader with his information needs at present? The last question has to be considered both ways, services to blind readers and sighted readers separately, because the material available differs, and the means of distribution also differ. Further comments on the proposed system for the distribution of material to blind readers appears in the section on "Implications for Librarianship."

The National Braille Press has supplied the investigator with the following information, which can be considered representative.

> The first copy of a serial costs about $300, additional copies cost about .50¢ to produce. The National Geographic is about 200 pages ... and comes in two Braille volumes ... The cost per page is about $3.97 ...[14]

Table 1-8 breaks down the cost of producing a Braille serial issue, based on data supplied by National Braille Press. The Appendix includes assorted information on standards for press Braille.[15] The information from Staack's thesis, A Study of Braille Code Revision, (MIT, Master's Thesis, 1962), although written for a different purpose does give information on the approximate amount of space saved by contractions in English Braille and therefore an estimate of the number of characters appearing in the Braille edition of a work.[16] These two items can serve as estimators in figuring the size and thus the cost of a press Braille volume. For comparison, the inkprint volume (12 issues) of the Geographic costs about half the price quoted, or $12. yearly.

Because of the lack of information on the costs of preparation of serial volumes for use, the breakdown given is only approximate. Information presented at a conference sponsored by the LARC Association, Proceedings of LARC Computer-Based Unit Cost Studies Institute,[17] held in 1971, provide the basis for the times used in Table 1-9 on cost of providing a user with serial material in a large academic library, and Table 1-10 on the costs of providing a reader with serial material from a regional Library for the Blind.[18,19] Other material used in compiling these Tables was supplied by the Board of Higher Education,[20] the Professional Staff Congress,[21] Division for the Blind and Physically Handicapped of the Library of Congress,[22] The Budget of the United States,[23] and the Executive Budget of the City of New York.[24] Under the existing conditions, periodical material does not circulate in the academic library, and the Library for the Blind only orders the material requested for its readers, called "Direct circulation." The material is not catalogued, and does not have to be returned. Other notes affecting the calculations appear in the tables.

The readers are broken down by curriculum areas, viz., humanities, education, sciences, social sciences, and only full-time matriculated undergraduates are considered. Similarly only full-time matriculated graduate students are considered. Because there are several libraries, and the library areas do not match, the curriculum areas have been realigned to conform to the library structure. In the library for the blind, exact information on reader characteristics is lacking, and the collection statistics are broken down by medium, i.e., large type, talking books, cassettes, and Braille, and the readers into individuals and deposit collections users. The samples used, namely the 290 Braille users at the local library for the blind, and the approximately 9000 students do not have the same characteristics. In fact, according to the American Foundation for the Blind, for the year 1975 there are "an estimated blind population (legally blind included) of 1.7 million, 1.1 million of whom are 65 [illegible] older...3000 of whom are in college...and 20,000 are employed."[25] The BHE does not have statistics on the number of blind students in the City University, or on their use of Braille. The academic library does not have a large collection of 'general interest serials.' As far as the Library for the Blind is concerned, "for the second region (which includes New York, 58% are not in the labor force."[26] Scientific and professional journals are a negligible fraction of the collection.[27]

Thus the data here is not directly comparable, however the costs involved just for the material itself can be compared. Table I-11 summarizes the costs of providing just the periodical and it can be seen that scientific journals cost at least double the general information serials, and the cost of Braille is about double the cost of print. So the costs are known for providing scientific and technical material by current means, and they would be prohibitive, being approximately four times the cost of providing recreational type material.

The group of users of Braille for purposes of this project is to be restricted to the employed blind, roughly between 25 and 40 years of age. At the time Goldish wrote his thesis (1967) he estimated that there were "about 2500 employed blind in the 25-40 age group, approximately 20% of whom used Braille, whose use for Braille would be for letters and office correspondence, use of journals and professional literature...and presently increasing at a rate of about 300 persons yearly."[28] In the 9 years since then that would be a total population increase of 300/2500 or approximately 12% per year for 9 years compounded or an increase of 4433 persons, for a 1975 population in th-s group of 6933, a fifth of whom would probably be fluent in Braille[29] or approximately 1387 persons. The estimated 8% of the blind population according to the American Foundation for the Blind is"8% of 1.7 million severely impaired, which includes 400,000 totally blind are in the 25-40 age group; and 12% of these are employed,"[30] or approximately 16,320 people, 20% of whom would know Braille or a Braille-using population of 3264 people.

Gill[31] suggests that the figures given in the statistics do not bear any relation to demand. He states

> The statistics do not present any relation to demand. Before implementation of the Braille abstracts there was no demand because the material was not there. 1800-2000 40 page copies are now being sent to the United States...[32]

In addition, none of this material is reported in any group of readers' statistics, because the Division for the Blind and Physically Handicapped are not keeping statistics of such ephemeral material. This work is the only kind of information on the use of scientific-type materials. And this is only an abstracting service. That is, it provides not the literature itself, but references to the literature. Any computerized Braille service is going to have to provide article access rather than volume access. So the problem resolves itself into providing volumes of roughly anywhere from one to five hundred thousand words, translating a *particular* article into Braille, and transmitting it to the ultimate user. What are the costs involved? The basic costs of the system that is proposed have already been outlined. The cost of data preparation is very significant, phone charges only less so, considering the sites of both the remote and central stations. Table I-12 presents the average length of long and short articles for a 32 journal sample, according to print page size, the number of words in print and Braille cells and the cost per article. More crucial is the fact that the need for information by professionals is for a large number of small pieces of current information at a time. However, the use of each item is relatively low and this may be the crux of the problem. Leavey[33] conducted a survey to determine whether Recordings for the Blind should produce serials

> he sent a group of 60 blind professionals a list of journals, and he reports that very few of the journals were read by more than two people...[34]

Considering the fact that a majority of the blind use aural means, this statement is significant. In light of the much smaller demand for Braille that is measured, the cost of providing this service is prohibitive, with the possible exception of provision of governemtn support and establishment of a network of regional centers instead of every local library being a center. However, since we do not know what the total demand for Braille is or the characteristics affecting the reading habits of blind professionals, it is difficult to know with any certainty *what* to produce, and how much to produce in Braille by computer.

The next section will discuss the implications of the feasibility study as they affect the supply of materials in Braille, the demand for such materials, and other factors hearing on the use of Braille as a reading medium.

Table I-1

PRICE FOR SAMPLE CENTRAL SITE CONFIGURATION[35,36]

Model #	Description	Quantity	Price (per Month)	Extension
3145-12	CPU 512K[a,d]	1	$ 21,000	$21,000
3047	Power Unit	1	400	400
1403-N1	Printer[b]	1	1,000	1,000
2821	Control[b]	1	600	600
3411-3	Tape Track	1	700	700
3333	Disc Drives	2[c]	1,800	1,800
3330	Disc Drives	2[c]	1,400	1,400
3704	Communication Control	1	200	200
3215	Operator Console	1	200	200

[a] 524,488 bytes K=1024 bytes

[b] One each required for remote

[c] Each unit contains 2 spindles and integrated control (3333)

[d] Each additional 250K costs $2,800 extra

PRICE FOR SAMPLE REMOTE SITE CONFIGURATION

Model #	Description	Quantity	Price (per Month)	Extension
1403-N1	Printer	1	1,000	1,000
2821	Control	1	600	600
2250-3	Graphics Console	1	1,200	1,200

Total Cost for Central Site $27,300[e]

Total Cost for Remote Site 2,800[e]

[e] Includes maintenance and operating system (central site)

Source: IBM Corp. DP Sales Manual for Prices
System/370 Model 145 Fact Folder (G520-2893-3)
For Model information.

TABLE I-2

PHONE SERVICE AND RATES[37]

Model #		Connection	Monthly Charge[a]
103B2/804B1	4800/9600 baud[b]	$138.13	$ 125.00

[a] Charge for Equipment only, does not include business phone charges for use. Contract is 3-12 Months plus installation.

[b] baud is unit of line speed-1 bit/second. 4 wire in sequence 54816

Optional Channel Conditioners

C1	$ 19.23	$ 19.23
C2	36.34	48.06
C4	76.98	96.11
D1	6.	75.

"for private line facilities and leased line channels... the minimum charge for service is the charge for one month ...except as provided otherwise in this tariff..."[c]

[c] NYS Public Service Commission, '800' Tariff-Telephone, 5th revised p4.

Source: New York Telephone Company

TABLE I-3

SUPPLIES

	Quantity	Price
Punched cards	10M	$ 35
1316 Disc Pack	1	150
Paper:		
Standard 1 part 14.7x11"	3200	6.35/M.
Braille 90lb. index	5000	62.50/100

Modification to 1403 printer:

RPQ Braille IBM FE part RPQ F19229.

Elastomer Braille IBM FE part RPQ 818047
(Free from IBM).

Sources: IBM for modifications and disc pack
Advance Tab Card Co. for punched cards.
Moore Business Forms for paper.

TABLE I-4

COST OF ONE PAGE BRAILLE TRANSLATION

A. Costs of System Services - CUNY Computer Center

Read Cards	$0.75/1000
Print Lines	1.00/1000
Paper - 1 Part	1.00/100
CPU Usage	5.40/minute
(includes I/O)	
Tape Mount	.50/mount
Tape Drive Use	.25/minute
Region Factor	1 for default region of 130K
SRC Multiplier	1 for priority 05

B. Cost of translation of page of inkprint text-1/2 page text.

OVERHEAD COSTS FOR JOB			
Prepare data for translation		$ 0.34	
Prepare DOTSYS for execution			
	Compile	2.37	
	Link Edit	0.45	
Tape Mount		0.50	
Tape Use		0.17	.678 min.
TOTAL Overhead		$ 4.13	3.83
COST OF EXECUTION			
Execute DOTSYS		$ 0.55	1102 min.
Proof text-163 lines		0.17	
Pages of proof - approx. 2 1/2		0.03	

TABLE I-4 (Continued)

Total Cost of usable output	$ 0.75	
OTHER PRINTED OUTPUT-- 2239 lines	2.24	
44.5 pages	0.45	
Total Cost per page	$ 3.44/2 1/2	$ 1.38
Share of overhead	3.83/2 1/2	1.53
Total Cost	$ 7.27	
-per Page		$ 2.91

TIME-Total Overhead time	.574 min.
Execution	.102 min.
Print - 2 1/2 pages	.0001 min.
-----Print - Other output	.0019 min.
Total Time	.6780 min.
-per Page	.051 min.
	.00004 min.
	.05104 min.
	.31348 min.
-per Page including Overhead	.36452 min./page
-Pages/hour = 1/min/page x 60 min/hr =	164.6

TABLE I-4 (Concluded)

[*] The listing appears bound separately with the other computer listings. Proof output is shown, i.e., input text, Braille output, corresponding print representation of the Braille output, and errors are flagged.

Source: Accounting information from last page of listing.

TABLE I-5

WORD COUNTS PER ARTICLE*, PER ISSUE, AND DATA PREPARATION COSTS PER 100,000 WORDS FOR COMPOSITOR'S TAPE AND CARDS.

Journal	Words per Issue	Words per Article
Review of Educational Research	64,916	10,666
Slavic Review	91,020	11,378
Urban Studies	64,260	4,943
Social Work	20,935	2,326
Latin American Research Review	96,052	13,722
J. General Education	33,437	3,715
International Philosophical Quarterly	61,920	6,880
English Language Notes	18,026	3,993
Language Quarterly	31,334	2,849
Quarterly J. of Speech	58,968	7,371
LRTS	47,693	3,407
Adult Education	19,678	4,919
Computer Journal	95,306	5,606
British J. of Nutrition	57,072	5,188
Biophysical J.	62,400	5,673
Physics of Fluids	101,790	4,847
International J. Comparative Sociology	38,976	9,744
International Economic Review	127,200	7,482

TABLE I-5 (Continued)

Journal	Words per Issue	Words per Article
Canadian Journal of Political Science	80,947	6,227
Canadian J. Psychology	47,174	3,931
Administrative Mgmt.	47,488	3,392
Accounting Review	131,544	4,698
Law and Contemporary Problems	89,600	11,200
Public Administration Review	64,973	5,414
Archives of Environmental Health	48,384	3,226
AICHE Journal	184,576	5,127
American Journal of Public Health	72,106	4,507
American Journal of Physical Anthropology	90,367	4,518
Yale Review	59,674	5,967
Journal of Environmental Health	59,558	3,135
Nursing Forum	78,106	6,509
Mathematics Magazine	53,760	4,480
AVERAGE FOR SAMPLE	68,726	5,689

*Journals have different page sizes and frequencies. Type area of page was measured and converted to number of characters of 9pt (one eighth inch square) type. This was multiplied by number of pages of articles excluding advertising. This is words per issue when divided by 5.

Words per article was computed by dividing the number of articles including features into the page count. Conversion to words was computed as above.

The figures average for sample will be used in the cost section of this table.

TABLE I-5 (Continued)

DATA PREPARATION COST

	TAPE		CARDS	
Labor:	35.7 Hours at $6.50 per hour (14,000 characters per hour)	$232.05	44 hours at $4. per hour (100,000 words)	$176.
Equipment:	Cost data not available		(30¢/hour 576 hours per month)	13.20
Supplies:	Cost data not available		($35/10M)	21.875
Total:		$232.05**		$211.08

Sample Issue

68,276 Words or 343,630 Characters

TAPE	CARDS
$159.54**	$144.11

** imputed cost-no actual cash outlay.

Source: Periodicals: Sample from NYPL. Fields are same as student majors.

Typesetting: Sal Guarnieri

Card/Disc data entry: John Gill.

Card prices: Advance Tab Card Co.

TABLE I-6

MINICOMPUTER CONFIGURATION OF DOTSYS III

Due to delay in receipt of information on the minicomputer configuration of DOTSYS III, the information on that implementation will be available at a later date ..

TABLE I-7

SUMMARY OF COSTS OF PRODUCTION OF BRAILLE*

Data Preparation:	
Compositors tape**	$232.05/100000 words
Cards	211.08/100000 words
Disc	176 /100000 words
Braille Translation:	
Preparation of DOTSYS for execution	3.49***
Execution of DOTSYS	1.10 per inkprint page
Output:	
Printed on Braille paper:	
Per Page	.625
Per Braille page (25 lines)	.75 (3 lines per cell $0.01 per line)
	$1.375
Stored on disc:	
Per 15 Braille pages	$0.1246****

*Does not include cost of copying translated text from disc to printer.

**Imputed cost.

***One time only. Figure is for batch environment.

****Disc contains 7676 tracks each holding 13030 bytes
Figure is computed as 15 x 200 x 6 plus 135 bytes for the system.
Cost per track is approximately $0.02.

Source: Tables I-3, I-4, I-5.

TABLE I-8

Costs of Production of a Serial-Press Braille[*]

Labor:	Stereotyper-Proofreader	$ 2.40
Supply: and Adm. Exp.	Zinc Plate	.50
	Administrative Expenses/Overhead	1.00
	Paper-per page	.0276
	Envelope	.053
	PER PAGE	$3.986

National Geographic (June Issue) Brailled in 2v, 200 pp.

Total cost:	First copy	$797.20
	Additional Copies	50.00

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[*] Process assumes correctly edited text. No photographic or other pictorial reproductions.

Source: National Braille Press.

TABLE I-9

COST OF PROVIDING A SERIAL-LIBRARIES, CCNY*,**

I.	Materials	
	3427 Titles @ $189,524	$55.30
	1/2% service charge	.28
	Total per volume	$55.58
II.	Set of 8 catalog cards from LC	$ 1.00
III.	Cost of preparation: Staff time	
	Serials:	
	Administration	$0.35
	Records	0.59
	Certification of Invoices, Processing Payments	0.18
	Processing Claims	0.05
	Binding	0.22
	Correspondence with Dealers	0.02
	Acquisition	
	Receiving	0.10
	Cataloging	
	Administration	$0.31
	Original Cataloging	0.39
	Public Catalog Maintenance	0.69
	Supervision and Training	0.20
	Bibliographic Search	0.10
	Internal Conference	0.08
	Revision of Routine Cataloguing	0.37
	Catalog card Production	0.31
	Bibliographic Searching	
	Administration	$0.06
	Bibliographic Searching	0.33
	Routine Cataloguing	0.42
TOTAL STAFF CHARGES:		$4.77
IV.	Binding	$4.56
V.	Other Expenditures	$1.28
Estimated total cost of volume		$67.19
Used by 8829 matriculated students		
Cost per student borrower		$0.007

TABLE I-9 (Continued)

Circulation:

Total	32,530
Humanities	
Social Science	11,300
Education	
Psychology	18,928
Sciences	2,302

Circulation per borrower:

Total	3.68	(32,530/8829)
Humanities		
Social Science	3.34	(11,300/3388)
Education		
Psychology	7.62	(18,928/2484)
Sciences	.78	(2,302/2957)

Cost of providing circulation:

Total	$00.03
Humanities	
Social Sciences	$00.02
Education	
Psychology	$00.05
Sciences	$00.005

*Form of the data under Cost of Preparation: Staff Time is after Axford. His time data were used unchanged.

Student assistant rate $2.03 per hour.

Clerical Staff rate $4.19 per hour.

Sub Professional rate (average of twice lowest CLT 'A' salary and CLT 'B' salary) $7.74 per hour.

Professional rate $7.05 per hour. (Instructor)

Rate was converted into rate per hundredth of a minute and applied to the time data in the tables.

Professional rate from AAUP Bulletin, (June, 1973), p. 194. corrected for inflation at the 3rd quarter of 1974.

Sources: BHE for student data

TABLE I-9 (Continued)

CUNY/PSC contract for wage data
Axford for time breakdown
Library data from CCNY Libraries Annual Report for 1974-1975.
(Citations appear in the text).

[**] Amount of space occupied by the library and rent and utilities charges were unavailable.

Serials Department doesn't keep unit cost statistics.

TABLE I-10

COSTS OF PROVIDING A READER WITH SERIAL MATERIALS, LIBRARY FOR THE BLIND, NEW YORK CITY*

I. Materials: Serials are 'direct circulation' 21 titles authorized new in 1974. Average cost	$38.00
II. Preparation: Staff Time	
Serials:	
Administration: Periodical Records	$ 0.06
Open sort and deliver mail	0.02
Revise typing, sign and mail requests	0.002
Prepare invoiced for payment	0.002
Prepare invoices for payment	0.01
File forms in completed record or discard	0.008
Requestor norification routine	0.002
Claims Routine	0.04
Cancellation Routine	0.03
General Typing-Correspondence, etc.	0.008
General Filing	0.002
General Typing	0.02
General Filing	0.004
TOTAL STAFF TIME PER VOLUME	$ 0.21
III. Supplies and Equipment	$ 0.0164
IV. Fixed Costs:	
Building Maintenance and Security	
Centralized Executive Management	
Manhattan Borough Office	
Branch Librarian**	
TOTAL FIXED COST PER VOLUME***	$ 0.21
V. Direct mail circulation:	
Approximate number of subscriptions****	808
Registered Braille Borrowers	290
Circulation per borrower	808/290 2.79 Subscriptions

TABLE I-10 (Continued)

VI. Cost of providing materials to borrower:

Materials	$106.02
Processing Time	.58
Supplies	.016
Fixed Cost	.58
Total Cost of Providing Materials	$107.196

[*] See Table 1-9 notes for manner of computing cost data. Rate for clerk is $3.25 per hour. This is half-time rate. Rate for librarian is $5.46 per hour. Half-time rate. These rates include allowances for benefits and are computed as averages of the ranges of the salaries for these positions.

[**] Branch librarian salary computed as an average as above.

[***] There are approximately 338,000 volumes circulated during 1974 in all media.

[****] Figure given in source cited in text is 9700 issues. Twelve (12) issues per volume assumed.

Source: Budget of NYPL Library for Blind and Physically Handicapped, for fixed expenses and staff complement.
Campbell interview for staff performing serials function.
Supplementary tables of NYC Executive budget, p.169 for employee grades and salaries.
Circulation data and reader data is from DBPH.

TABLES I-11

COSTS OF SERIALS IN SAMPLES

Serial	Cost
Review of Education Research	$ 10.00
Slavic Review	15.00
Urban Studies	7.50
Social Work	2.00xx
Latin American Research Review	13.00
Journal of General Education	9.00
International Philosophical Quarterly	8.00
English Language Notes	4.00
Language Quarterly	Not Available
Quarterly Journal of Speech	15.00
LRTS	7.50
Adult Education	10.00
Computer Journal	12.60
British Journal of Nutrition	84.00
Biophysical Journal	35.00
Physics of Fluids	75.00
International Journal of Comparative Sociology	16.00
International Economic Review	13.00
Canadian Journal of Political Science	12.00
Canadian Journal of Psychology	10.00
Administrative Management	7.00

TABLE I-11 (Continued)

Serial	Cost
Accounting Review	$ 15.00
Law and Contemporary Problems	10.00
Public Administration Review	25.00
Archives of Environmental Health	12.00
AIChE Journal	50.00
American Journal of Public Health	20.00
American Journal of Physical Anthropology	42.00
Yale Review	6.00
Journal of Environmental Health	10.00
Nursing Forum	7.50
Mathematics Magazine	4.00
Better Homes and Gardens	4.00
Blind Data Processor	Free From DBPH
National Geographic	9.00
Psychology Today	12.00
American Girl	5.00
Boy's Life	4.00
Braille Chess	20p[xxx]
Braille Journal of Physiology	Free From DBPH
Braille Mirror	Free
Braille Music	35p[xxx]
Braille Variety News	3.00
Children' Digest	5.95

TABLE I-11 (Continued)

Serial	Cost
Jack and Jill	$ 5.95
Consumer Reports	8.00
Fortune	16.00
Horizon	20.00
Journal of Rehabilitation	5.00
Galaxy	9.00
Today's Health	5.00
Playboy	10.00
New Beacon	55p

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[*] Most of these figures are for print editions. [xx] South African Rand. [xxx] Pence.

Source: TABLES 1-5 and 2-5 for journals
Prices: Katz, Bill, Magazines for Libraries. (2 ed; New York: Bowker, 1972), 822 p.

Ulrichs International Periodicals Directory. (16 ed; New York: Bowker, 1975), 2289p.

TABLE I-12

CHARACTERISTICS OF SAMPLE OF PROFESSIONAL AND SCHOLARLY JOURNALS*,**

No.	Char/pg	Size (9pt)	# Articles	Av. Pgs.	Characters	Brl cells/pgs.	Cost
1	2016	36 x 56	0s/51	0/28	56448	41856/46.5	$ 32.19
2	2220	37 x 60	1s/71	8/28	17760	13169/14.6	8.92
					62160	46092/51.2	36.93
3	3213	51 x 63	11s/21	5.6/23	17993	13342/14.8	6.28
					17890	54796/60.9	25.80
4	2684	44 x 61	8s/11	5.5/11	12078	8956/10	5.03
					29524	21892/24.3	12.30
5	2035	37 x 55	0s/71	0/32.4	65120	48286/53.7	36.09
6	1944	36 x 54	3s/61	5.7/11.5	11081	8217/9.1	6.35
					22356	16577/18.4	12.80
7	2400	40 x 60	3s/61	4.3/19.2	10320	7652/8.5	4.80
					46080	34168/38	21.44
8	1836	34 x 54	5s/31	6/20	11016	8168/9.1	6.88
					36720	37228/30.3	22.25
9	3264	48 x 68	10s/01	4.7	15341	11375/12.6	5.27
10	2730	42 x 65	2s/61	7.5/15.3	20475	15182/16.9	8.39
					41769	30972/14.4	17.1[illegible]
11	3456	48 x 72	10s/31	4.3/10.7	14861	11019/12.2	4.83
					36979	27420/30.5	12.02
12	2008	38 x 56	1s/31	8/11.7	16064	11911/13.2	8.91
					23494	17420/19.4	13.03
13	5124	61 x 84	15s/01	6.1/0	31256	23176/25.8	6.92
14	2460	41 x 60	4s/71	7/12.4	17220	12769/14.2	7.82
					30504	22669/25.1	13.85
15	2400	40 x 60	6s/31	3.2/22.2	7680	5695/6.3	3.57
					53280	39507/43.9	24.78
16	4350	58 x 75	33s/11	4.7/10	19975	14811/16.5	5.31
					43500	32255/35.8	11.30
17	2320	40 x 58	0s/41	0/21.25	49300	36556/40.6	23.71
18	2400	60 x 80	2s/151	7.5/17	18000	13347/14.8	8.37
					40800	30253/33.6	18.98
19	2176	34 x 64	4s/91	3/19.4	6528	4841/5.4	3.34
					42214	31302/34.8	21.63
20	2016	36 x 56	8s/41	7.25/13.75	14616	10838/12	8.07
					27720	20554/20.8	15.31

TABLE I-12 (Continued)

No.	Char/pg.	Size (9 pt)	# Articles	Ave. Pgs.	Characters	Brl cells/pgs.	Cost
21	2835	45 x 63	15s/121	4.4/14	12474/39690	9244/29430/10.3/32.7	9.93/15.67
22	4480	56 x 80	10s/41	2.1/14	9408/62720	6976/49507/7.9/51.7	2.37/15.83
23	2560	40 x 64	1s/71	1/25	2560/64000	7898/47456/2.1/52.7	1.18/27.93
24	3450	48 x 72	9s/31	6.4/10.7	22118/36979	16400/27420/18.2/30.5	7.19/12.02
25	4032	56 x 72	14s/11	4.1/10	16531/40320	12258/29897/13.6/33.2	4.62/11.28
26	4480	36 x 80	29s/71	4/12.7	17920/56896	13288/42188/14.8/46.9	4.52/14.36
27	4144	56 x 74	15s/11	4.1/14	16990/58016	8149/43019/9/47.8	4.58.15.80
28	2772	44 x 63	10s/101	4.5/11.7	12339/32081	9149/23788/10.2/26.4	5.03/13.09
29	2072	37 x 56	2s/81	3.5/17.7	7252/36674	5377/27194/6/30.2	3.90/19.72
30	3168	42 x 66	17s/21	3.5/14.5	11088/45936	8222/34062/9.1/37.8	3.93/16.26
31	3456	48 x 72	8s/41	5.1/16.8	17626/58061	13076/43052/14.5/47.9	5.73/18.88
32	4480	56 x 80	11s/11	4/16	17920/71680	13288/53151/14.8/59	4.52/18.09

* Numbers refer to the same items as in Table I-4. Figures are for average articles, not issues.

** 9pt type is 1/8" square. Figures for short (less than 10 pg.) articles preced those for longer articles. Figures for pages exclude advertising and photographs, and are for an issue. Braille cells were calculated using data in appendix A-1. Pages were calculated using information in appendix A-2. Use of compositor's tapes assumed for input, output stored on disc. Cost is figured at $1.10 per print page, plus $0.1246 per 15 Braille pages. (5440 bytes per page x 15) + 135 = 6.23 tracks at $0.02 per track. These are for master copies; user copies would be cheaper costing .65 per Braille sheet and use of the data copy utility. Setup time for DOTSYS III not included. These figures are less expensive than press Braille but more expensive than corresponding print media.

II-1

IMPLICATIONS FOR LIBRARIANSHIP

The material for this part of the present study consists of four basic parts; the parts bear no direct relationship to each other in a mathematical or statistical sense, but help concerned librarians come to grips with the problems, and issues involved. The sections deal with the problem of identifying the information needs of the blind professional, making material available more easily in Braille and are concerned primarily with problems posed by copyright and economics of Braille publication and distribution, impact and prognosis for computer Braille, and recommendations. An appendix consisting of material not conveniently put into the body of the text or the feasibility study rounds out the text. Information is basically qualitative and inferential, quantitative data either being unavailable, nonexistent, or not reliable. Most of the information was gained by interviewing persons directly involved either in currently supplying information to the blind, or in research.

Before the question of identification of the information needs of the blind professional is tackled, we have to know who the blind are. Any librarian who is trying to improve services, or start a new service, first should look at the current or prospective users of the proposed services. The same should apply to those who are concerned with library service to the blind, identification of the 'community' to be served. It is almost a decade since Goldish wrote his thesis. In that decade, the blind have moved into areas where they haven't been before, and we still do not know how many persons are blind, even though there are State agencies in most states, which provide rehabilitation services, and also maintain a register of blind persons. In New York this agency is The Commission for the Blind and Visually Handicapped, and, according to State law, all blind individuals are to be registered with the Classification Section of the Commission. Henry McNair, of the Queens office, stated in a conference with this investigator that

> Even though the law requires all visually handicapped persons to be registered, the doctors balk when one of their patients is losing his sight...A certain percentage of the blind are not known to the Commission... You want to do a survey...how are you going to get names?[38]

Another counselor, with a different state agency, confirmed what McNair said and adds with regard to the employed blind

> that he does not know of any statistics of the blind population using Braille, and that it is impossible to get such statistics - perhaps you could do a cross-sectional study of those placed professionally, or contact those individually at college. It would be possible to go through counselors' caseloads, assuming access could be granted, and collect statistics on a case by case basis. The agency knows what fields their clients are studying, and what media they are using, but does not know the extent of use...[39]

The two opinions cited can be considered representative of the lack of information at the official governmental level.

The situation is the same as far as those people who are trying to meet the information needs of the blind are concerned. In a report to the Assistant Commissioner for Libraries of The New York State Education

Department, entitled Improving Library Service to the Blind, Partially Sighted and Physically Handicapped in New York State: A Report to the Assistant Commissioner For Libraries, published in 1973, Prentiss states the following

> Adequate data do not now exist...and it would be well beyond the scope of this study to attempt to generate complete and exact data to illustrate the situation, and library needs of selective media readers, or the best means of meeting those needs...[40]

and this pretty much sums up the problem.

Information on the professional interests and information needs of the blind is similarly lacking, or unreliable. The Library of Congress' Division for the Blind and Physically Handicapped conducted a reader survey based on the publication Talking Book Topics including the Braille Book Review in 1974, based on a 10% sample. The survey questionnaire included questions on the use of Braille/other media, occupational status, occupation, choice of books/magazines, and the type of material read.[41] In the report of the analysis of this survey, it is noted

> that the sampling procedure was not chosen or designed to control statistical representation from each region... not all respondents replied to each question. The rule was to include individual questions, rather than discard the questionnaire because of incompleteness.[42]

In the same survey it was stated that "34% were in professional or technical occupations."[43] In an attempt to clarify the situation the investigator sent a letter to Richard Evenson, Program Analyst at DBPH who told the investigator that the respondents selected, how to enter their occupations. DBPH is unable to supply data on professional reading habits and use of Braille since statistics are not kept, and the Survey would not provide the information you require...[44]

As far as the demand for Braille is concerned, we are on slightly stronger ground. A relatively small proportion of the blind are fluent in Braille, and most of these learned it in the schools. Davis reported to this investigator that

> most are not proficient in Braille. It must be used consistently. The congenitally blind are very proficient since they learn it in school. If it is not used, speed will be lost...Before the advent of tape, Braille was the primary medium; if you did not know Braille, what could you do? Now that tape is available it is easier to listen. The problem is staying with it (Braille)...[45]

There is a direct relationship between age and blindness. Most of the elderly, or those who lose their sight, do not become proficient in Braille. Mike Coyle of the Free Library of Philadelphia told the investigator

> most of the technical magazines are on tape. Most of the Braille periodical circulation is general information material. Of 14,000 readers, 800 read Braille, and 60% of these are over 55. Technology is coming, particularly the Optacon, and speech reading. The computer will also be used but it is not good for short runs. The demand isn't there...[46]

As far as the demand for Braille is concerned, everybody is on the same shaky ground because there are no statistics. Generally, however, there is agreement that the older a blind person is, the less likely he will read, or even be fluent in Braille. Alfred Hagle told the investigator that "the elderly do not read Braille. Only 1/5 of the legally blind are fluent in Braille."[47] The investigator does not have statistics on the number of professionals who are blind in Europe, but only of the total number of the blind in those countries he visited. Cramer, of the Danish Society for the Blind told the investigator, "8000 are blind in Denmark, 800 of whom are able to read Braille."[48] The same ratio holds for Sweden, and England, but the investigator does not have an exact figure. Everywhere, the investigator was informed that the majority of the blind are elderly.

In the U. S., there are a variety of groups, individuals, government and other agencies producing Braille and material in other forms, but there is no coordinated catalog of what is available. Friedman, of the Howe Press, and Dalrymple, of MIT, both told the investigator that, "it is not a case of no standards, but everybody having his own standard."[49,50] Friedman added further, "there are many blind whose needs are not being met, and we don't even know how many there are. As a printer, I would like to know."[51]

In fact, a developing trend of having the blind educated in regular schools has two implications here. The first, is that those who go to regular schools and colleges are subsumed for the most part in the statistics of the educational institution. Thus, the BHE who are the trustees of the City University, do not have separate statistics on who is blind or disabled, as the statistics used for the sighted reader population show.[52] In addition, the same legislation that covers 'affirmative action' as one of its enactments, also considers the disabled as a 'minority' subject to these provisions. In some cases this may make the problem of gathering statistics more difficult.

A personal aside will introduce the second implication. As a youngster, this investigator had seen one of the best eye doctors in the country, and he had said that there was nothing that he could do, and that a special school should be selected. When everything was almost ready, it was discovered that reading was possible, and eventually the investigator armed with a huge magnifier, a few large print books, and glasses so heavy they had to be tied on, entered the public schools. That was 20 years ago. Technology has changed the life of the visually impaired, and more of them are going to regular schools, with appropriate aids, of course.

Continuing in the same vein, Davis said that, "during the past five or ten years there has been a change in the enrollment of the schools for the blind. The blind graduates of those schools used to be fluent in Braille, and then go on to further their careers. Now a large proportion of the students are multiply handicapped, and it is very unlikely that they will use Braille. A small percentage will probably be able to use tape. The multiple disabilities make the learning of Braille difficult if not impossible."[53]

The investigator is not an educator, but the implication of the second case makes him uncomfortable. To deal with both groups we need to know who they are, and for the purpose of this study that means complete and accurate data on the number of blind and their educational goals and capabilities.

Table II-1 gives the number of blind in the various professions in New York City, using data supplied by the State Commission for the Blind.[54] Table II-2 gives the data received from the BHE concerning the students using the academic library. Table II-3 breaks down into the four areas, Humanities, Education, Sciences, and Social Sciences.[55] Data from Table II-II-2 are included here also. These Tables are provided to give an idea of the kind of 'spread' that the sighted and blind population presents.

It has been suggested to the investigator that there is a need for blind lawyers for case decisions and other current material. However, aside from the fact that the style of approach is similar, without additional information, the investigator cannot come to a definite conclusion as to the proper course of action. The 'extensive' use of material, each part of which is not read completely, i.e., every word is not read, is the same pattern in all the professions. The LC reader survey cited earlier shows that, "about 10% of the periodical reading was in the scientific and professional areas."[56] Table II-4 shows the percentage of periodical material available in Braille, through DBPH, that relate to the professions. Loan in the parlance of the DBPH, in reference to serials, means that the DBPH will actually subscribe to the periodical, and you will get them on a regualr basis from the publisher. This is called 'direct circulation',[57] these materials are not catalogued, and do not need to be returned. Some of these items may also be subscribed to as in the usual manner. Table II-5 presents a sample of periodicals available through the Library for the Blind in New York, and the number of readers for each. Professional titles are marked.[58]

Which automatically leads to the next topic: availability of current material in Braille, and the economics of publication, and distribution.

The availability of current material depends on two basic things. First, has permission been given to reproduce the material by the copyright owner? Second, what is the demand for this material? Is it feasible to publish it in Braille? In the professions, current material is perishable. The practitioner of any of the professions needs his material fast, at least as fast as the material is made available to his sighted colleagues, and if that is not possible, with the shortest delay possible. What should be aimed for is an information system that is as good for the blind as it is for the sighted.

The Copyright Law, Title 17 of the United States Code, treats the rights of authors and other owners of literary property.

Generally, any reproduction of a copyrighted work requires the permission of the copyright holder. A work such as a journal, may have a copyright on its entire contents as well as each author having a copyright on his own contribution. Permission is required in that case from both copyright holders. The Copyright Law is in the process of revision, however, the staff of the Copyright Office could not advise me of the implications of the new law as far as computer translation of material is concerned. According to law the Copyright Office cannot give "advice on common law or State literary property laws."[59] As far as the computer is concerned, the investigator was informed by the Copyright Office that, "Copyrightable material must be humanly readable, or capable of being put into such a form that it would be humanly readable."[60] This puts a severe obstacle in the solution of having the journals originally published in machine readable form. Another problem of more seriousness is the matter of who is going to control access to the text in the process of being stored in a computer, the author or the publisher? Muller writes on this last point

> One of the major battles raging about the current efforts to revise the copyright laws, is the concern as to whether entry into an automated computer system is to be controlled by the author or the publisher...[61]

This point must be resolved before any long term work is done on a translation system, because it affects who is going to be involved in the management of the central site.

The basic problem here is to speed up the time it takes to clear a work for possible reproduction in Braille or recorded form. Licensing or other modification of the Copyright Laws seems to be a viable alternative. It should give the author the chance to refuse permission for reproduction, and at the same time restrict those agencies who are involved in reproduction of materials. The revision of Title 17 of the United States Code, does provide for this eventuality.[62] The bill, S22, presented to the House Committee on the Judiciary, on February 23, 1976, provides

> Section 710. Reproductions for use of the Blind and Physically Handicapped; Voluntary Licensing Forms and Procedures.
>
> The Registrar of Copyright shall, after consultation with the Chief of the Division for the Blind and Physically Handicapped and other appropriate officials of the Library of Congress, establish by regulation standardized forms and procedures by which, at the time applications covering certain specified categories of nondramatic literary works are submitted for registration under section 408 of this title, the copyright owner may voluntarily [my italics] grant to the Library of Congress a license to reproduce the copyrighted work by means of Braille, or similar tactile symbols....and to distribute the resulting copies... solely for the use of the blind and physically handicapped and under limited conditions to be specified in the standardized forms.[63]

Section 118 of the same bill should also be consulted.[64] Althogh the bill passed the Senate on February 19, 1976, the House has still to act on its bill.[65]

This is the position as of the current date. The aforementioned bill does offer a way out of the speed dilemma, but it is not yet law. According to Barbara Nugent, of the Library for the Blind and Physically Handicapped in New York, the clearance takes "anywhere from two months to two years,"[66] a period which would cause much current technical and professional material to become stale. Illustration II-1 is a reproduction of the card used to obtain clearance for recording/transcription by DBPH. Sally Campbell, also of the New York Regional Library told the investigator that "most of the blind professionals use readers."[67]

The problem is difficult and it is going to take time to evolve new procedures and legal safeguards to implement its solution, but these new approaches will need time to be implemented and tested. And it is not going to be inexpensive, at least as far as the initial data entry is concerned.

The problem of demand is even more intractable. With an average journal size of 500-600 pages yearly in print, which comes to roughly 900-1080 pages in Braille, and at approximately $4.00 to print a single page, the cost is about $3600 - $4320 for a single copy. Considering the astronomical explosion of information in the professions, the costs are well beyond the budget of even the largest research libraries, particularly in these times of economic strain. With the limited demand for any one journal, the cost per user is going to be very large. Prentiss reports

> One of the chief obstacles of these materials is their cost per user compared to conventional library materials, which are inexpensive only because they are used by so many people...their ownership can be shared by large numbers of people...[68]

This is based on conventional Braille publication. When a sighted researcher goes to the library, there is usually a small number of complete volumes of any one journal, and the user waits his turn. If a particular library does not have the volume, issue, or title that he needs he can use the facilities of another library, or one of the consortia of reference libraries. Libraries can pool their resources and obtain material that they otherwise would not be able to obtain on their own. The blind do not have anything like this, and certainly nothing approaching the resources of even the smallest public library. The Budget of the United States Government for the Fiscal Year 1976 gives a figure of "21 titles",[69] and their cost is not given. It turns out that this is the number of titles authorized to be added to the list of 'direct circulation' magazines. What this means has already been noted, but the interesting fact is that the cost of a subscription, which averages about $38,[70] is considered of little consequence. The fact that the magazines are not returned has been explained because of the condition of the volumes. When asked about the apparent 'waste' Richard Evenson told this investigator

> The circulation of each title is between 300 and 1700 copies (i.e., volumes). There is no saving on 25 volumes. Highest number of copies authorized is 16,00 and attempts are made to keep the total demand within this figure...Reasons for the use of 'direct mail' are that a majority of the items are also in the regional libraries, and readers complained about tardiness of receipt.[71]

The implication seems to be that this is adequate servie but this investigator is sure that none of his nonhandicapped colleagues would tolerate such service. Prentiss suggests "as remarkable as this progress is...in no way can it be considered a complete library program...there would still be a large gap between what they [regional libraries] can offer ...and what is available to normally sighted readers."[72] Friedman, of the Howe Press, suggested that "it is as if just giving the blind their Braille would be enough...there is much lip-service but no really coordinated program."[73] Gill told the investigator, "there is no viable market for computer Braille in the U. S."[74] He based his comments on the fact that the LC which certifies transcribers, and farms out the printing of periodicals, will not accept anything less than perfect grade 2 Braille.[75] The computer programs can only produce an approximation to grade two. Even conceding this point the question remains; Why aren't the sceintific and technical professionals using Braille? Gill's work demolished the reason because "there is no demand," as commented on, infra. We are definitely not talking about the elderly, so the "lack of fluency" argument falls away. Which means the only reason left is "the material is not there." And assuming the trend of blind students going into the professions will continue, there is no reason to think they will accept the status quo. And besides, certain material does not "read" well on tape, and readers are not always available. If this is so, why does Gill suggest, "the demand for Braille is enormous...It depends on the user and the material... We are meeting a small fraction of the demand..."[76] And the astonishing thing is that the users of this "Braille abstracting service "are not in the UK but in the USA. Perhaps the economic costs are great...but the social costs are even greater. There is not a lack of efforts to make the computer Braille a more accurate likeness of standard Braille, as witness the occasion of a workshop entitled "Compliance of Computer Programs with English Braille Rules, American Edition," held at AFB on June 7-8, 1976.[77] The real solution to this issue is not primarily economic, but political and social as well. This investigator can try to point out problems, and issues, but many people are going to have to be involved in order to solve this problem. Those who would be affected should also have a hand in the solution, and not just the workers 'for the blind.'

The implications of computer Braille translation of serials includes the following areas: first, the general nature of serials as compared to monographs, and problems connected with collection maintenance, second, the problems of retrospective, i.e., not current serial material, third, problems posed by computer Braille itself, fourth, problems of organizational structure and management, including differing means of distribution, fifth, types of material to be produced: journals themselves, abstracts to journals, and the need for adequate indexing, cataloguing, and bibliographic control. These are the most obvious areas. Before any large scale work is started, these areas must be researched. Detailed discussion is outside the scope of this study, and additionally the investigator does not have hard, conclusive evidence upon which to rely, for some of these areas, and these areas are mentioned with the hope of stimulating further research.

The basic difference between serials and monographs is that the serials are issued periodically on a continuing basis. This is not the case with monographs, even considering differences of editions of a monobraph, and ignoring monographic serials, such as yearboods, which are generally treated as monographs, i.e., they are catalogued and classified, but with an open entry. The serials, which are periodicals, are rarely completely catalogued, and require separate procedures for checking in each issue, completing volumes, and binding. In addition their ordering and cancellation are time-consuming procedures. Kostreba, of the Serials Division of the Library of Congress, summed it up when he told this investigator, "You are never completely finished with serials..."[78] There are constant problems with maintenance of a serials collection, for instance the completing of incomplete volumes, which involved acquisition of missing volumes or pages, and possibly rebinding. Costs are also a factor here, scientific journals being more expensive than general information periodicals.[79] The use of complete or more than minimal cataloguing, also increases costs. Thus serial collections are inherently more expensive to maintain than monographs, and the costs are continuing, rather than one-time.

Acquisition of back issues is costly, as prices are at least double, compared to the cost of a current issue. The more retrospective you get, the less certain is the chance of even obtaining a copy.[80] This has interesting ramifications for the present study, since if it is assumed that compositors' tapes would be available for current issues, the task of how to work with retrospective issues of a journal is a problem, and this can be as soon as within the past six months. There are microforms for the sighted, but at present there is no way that this investigator knows of to use microform as input to a Braille translator. Since the most current research is reported in the journals, a need for complete, or failing that, extensive holdings is a _sine qua non_ of reference collections in the sciences, because of the time gap between journal publication and appearance in such sources as monographs. Cooper explained to a class of which the investigator was a member, "that appearance in a text occurs about five years later than the original journal article."[81] And because one of the ultimate goals of the proposed system is to provide an "archival" source of technical journals in Braille, the issue of retrospective periodicals needs to be looked into further.

The problems posed by computer-generated Braille basically result from one basic problem: the computer can 'match' a pattern or 'translate' from one set of symbols to another, but what can it do with a concept like 'weak syllable', which is a function of pronunciation rather than 'pattern match'. Some translation programs attempt to relieve the problem caused by these 'context dependencies', the term uses to describe the problem generally, as described by Allen and Boroz in a paper entitled "Recent Improvements in Computer Braille Transcription" presented at the 1972 National Computer Conference,[82] Staack[83] and Gildea[84] attempt to solve the problem, one hand by proposing revision of Braille codes to put the standard in compliance with what the computer is able to produce, and on the other hand, by using a dictionary structure of some kind, as Truquet[85,86] has done with French Braille, or other means as the Millen algorithm used in DOTSYS.[87,88,89,90,91] Others, like the Dutch,[92] Danes[93,94] and Swedes[95,96] have solved the problem by revamping their Braille codes. The workshop cited at another place in this project, describes the American attempt to bring standard and computer Braille into better conformance. The reluctance of the LC to accept anything else except perfect grade 2 Braille[97,98] poses a problem that would seem to prevent government subsidy to provide financing for extensive Braille translation.[99,100] In fact, Gill infers, "this is the crux of the problem...the professional user of Braille is not opposed to less-than-perfect grade 2 Braille..."[101] And there this problem remains.

Organizational and management problems are basically concerned with the number and location of sites, and the means of transmitting translated text to the ultimate users. Included are such means as telephone or mail links, regional centers with mail delivery between centers, much like the cooperative library systems, and use of nonprinting Braille reproducers, such as 'Braille strips', for immediate read-only reference use.

It seems probable, considering the fact that the issue of custody of the inputted text has not been definitely decided, that publishers will be represented. The fact that grade 2 Braille is still the standard, and is backed by organizations that do transcription, as well as the Library of Congress, which certifies transcribers, at this time precludes the funding of a large scale venture by the government. A research organization, probably privately-funded, seems the only alternative, unless compromise on the use of less-than-perfect grade two Braille is reached. Coyle hints "that a possible site would be New York, midway between Boston and Washington."[102] Raider pointed out

> there should be several centers...each either sending text to be translated between them, and doing translation for those living in a region, or a single center suitably located, using either wire to transmit the Braille output to users, or using the mails (free for material for the blind) to send the translated material to the ultimate users. A small project, using a small amount of material and a suitable population should be the first step...[103]

These viewpoints are well-taken, but more information should be at hand, as indicated earlier.

The problem of what to produce is the last major area. Obviously, the system should have an index or catalog structure, so that individual items may be checked. The demonstration does in fact have capability for author, title, author-title, and subject searches, as well as shelflist maintenance capability, however a large system will require coordinate indexing and analytics (entries for parts of periodicals) to be really effective.

Leavey[104] and Friedman[105] both suggest the equivalent of a national bibliography of all material for the blind, either covering one medium, e.g., Braille, or all media. The largest producers of Braille and other recorded materials have their own catalogs, and it should be a relatively simple (though time consuming) matter to coordinate these into a national union catalog. With the use of multiple central sites this is obviously a necessity, particularly if mail is being used to deliver the material to the user, or if there is a division of labor by the centers, by subject or other criteria.

Concerning the mix of periodicals and abstracting/indexing media, this depends on the needs of the clientele to be served and is thus dependent on further analysis of the blind, employed professional population, and the distribution of material read, and the numbers in the various professions, all of which statistics are not known, either generally, or to the investigator. In a working system, both types of materials should be provided. Therefore, aside from the large scale bibliography, and the need for an integrated collection catalog, the actual mix of material will have to await further analysis.

This finished the look at computer Braille from the viewpoint of its application to the library setting, with an emphasis on the costs and benefits thereof, and some of the problems to be faced in the implementation of a working system. Two things should be noted: one of the major sources of material for the professional blind (exclusive of serials) is Recordings for the Blind, Inc. A cost breakdown similar to the ones for the libraries under study, is included in the appendix as Table A-3. Two other areas of technology under development are the use of time-compressed speech[106] and the Optacon, a photoelectronic optical-tactile conversion system that works off regular inkprint, and is available for purchase. Information on the Optacon appears in Table A-4.[107,108] Although the Optacon is in production, both of these devices have an unknown effect on the use of Braille, among the group under study; however, their potential should not be ignored as a substitute for the use of Braille.

RECOMMENDATIONS AND CONCLUSION

With respect to the areas of interest posed in the introduction the following may be concluded about the areas on an item by item basis. The areas will be considered in turn.

Economically, with respect to the design and development of a computer system for translation, storage, and dissemination of Braille materials, the following may be noted. Firstly, the cost of having each library maintain a complete system for the requesting and receipt of materials is expensive, rental of terminal equipment, as set forth in Table I-1, being on the order of $2800 monthly. Data preparation, whether from punched cards or disc input, by a typist is prohibitively expensive. Table II-5 summarizes the various input methods. For the system to be feasible, compositors' tapes seem to be the best choice, but problems of control still have to be resolved. Translation itself is relatively inexpensive; for the best results, the translated text should not be printed, but stored, and a utility program used to make the users' copies. Output is almost as expensive as input, most installations charging for both pages and actual lines of output. Continuous-form Braille paper of the type listed in Table I-3 is prohibitively expensive; it might be feasible to use a read-only device as an output transducer to cut down on costs. Generally, the cost-benefits of Braille serials are weighed, rather heavily against the proposed use thereof. A first copy is less expensive than the first copy of press Braille, but still many times the cost of providing sighted readers with similar material.

The foregoing analysis now leads naturally into the second area, that of implications for the library profession. As of the present time the problems are very difficult, and even more intractable than the economic ones. We just do not know enough about what professionals who are blind are reading, and how they are keeping up professionally. Research turned up nothing in the way of statistics. which indicates that this is the first problem that must be solved since questions of demand as well as type of materials to be used depend on accurate knowledge of the readership involved. Tables II-1 and A-5 display the dispersion of the blind professional; the first dealing with New York State, and the second dealing with Canada. Since there are comparatively fewer users of Braille, and the cost of its production is higher, there seems no way to have Braille materials as cheap or as widespread as print. Table A-6 is a sample questionnaire that might be used. However, it is going to be very difficult to find a sample population.

The availability of suitable material for the Braille-using professional is a severe lack, see Tables II-4 and II-5. Not enough data exists to make a complete analysis at the present time.

Copyright clearance is going to continue to be a problem. With certain journals having copyright on both their contents as a whole and each article separately, at the present time the lag in clearance is insurmountable since the proposed revision of Title 17 of the U.S. Code, although passed by the Senate, has not been acted upon by the House.

Problems of finance would seem to be dependent on the establishment of a foundation to conduct further research, given that the government will not support any effort using anything other than perfect Grade 2 Braille at the present time. At the present time a single center should be set up, pending the resolution of both the problem of identification of the blind professional Braille user, and an inquiry into the mix of journals and abstracts. In the long run however, it would seem feasible to have inquiry terminals and indexing by computer, and the delivery of the material using the present franking privilege. The question of printer representation on center governing-boards still has to be resolved at a later date.

Concerning computer Braille, it should be determined if the prospective user is adversely disposed to less-than-perfect Braille. The investigation assumed that the situation would be unchangeable in the short run, and nothing has occurred to dispute that conclusion.

The problem of what 'mix' of journals and abstracts to have is dependent of the habits of the readership, and a survey should obtain information that would be useful in deciding this issue. As far as a retrospective collection is concerned, the only feasible solution is the equivalent of superimposition, that is, all materials after a certain date will be translated, but nothing before. There is no other alternative.

Concerning indexing, a structure similar to the concept of a dataset composed of members, each being a sequential dataset, would seem to be the most practical, giving both access to the journal, and the individual articles, represented by the data set members. This could be supported by some type of file structure similar to the one in the demonstration.

With the conclusions presented, it is now time to decide on a coarse of action. The following is recommended.

1. Conduct a survey of blind professionals to determine their use of Braille, their current reading materials, and their desires for improved distribution, and type of material. Specific attention should be focused on their use of current abstracting services, and the journals they use most frequently but are not available. Determination of use of the proposed service should also be included. Possible avenues of distribution include the LC program, or more importantly, special interest groups of the major professional societies.
2. Analysis of the results of the questionnaire with the goal of preparation of a proposal to conduct further research.
3. Setting up a prototype Braille translation service to a sample of prospective users, using a mix of articles and journals selected from the questionnaire responses.
4. For the long run, developing a working, economically efficient means of distribution, and cooperation with libraries and publishers.
5. Keeping in touch with the needs of present and prospective users, determine the demand for and acceptance of a regional or larger center.
6. Depending of size of center, develop effective means of distribution and suitable organization of materials.

7. Areas for investigation other than those covered or suggested by the present research should be considered.

Items 1 through 3 are short-term projects which should result in an operational prototype center in a period of less than a half decade. The other items, with the exception of the last, should take a while longer.

TABLE II-1

PROFESSIONAL PALCEMENTS OF THE BLIND IN NEW YORK BY OCCUPATION AND AREA.*

HUMANITIES	
Language Interpreters and Specialists	6
T. V. Directors and Radio Broadcasters	5
EDUCATION	
Public School Teachers**	109
Guidance Counselors	5
College Professors***	25
SCIENCES	
Computer Programmers	25
Engineers****	2
SOCIAL SCIENCES	
Business and Business Administration	
Investment Officer	1
Marketing Specialist	4
Social Security Representatives	12
IRS Tax Representatives	12
Public Service	
Social Workers	15
Lawyers*****	25
NYS Employment Counselors	9

TABLE II-1 (Continued)

Rehabilitation Counselors		18	
Psychology			
Clinical Psychologists		12	
Totals:	HUMANITIES		11
	EDUCATION		139
	SCIENCES		27
	SOCIAL SCIENCES		96
	ALL AREAS		273

Notes to Table 2-1

*New York City not included separately. Based on Civil Service and some private placement records.

**Approximately 89 teach in State. All levels are represented K through High School--included are four blind science teachers and one industrial arts teacher.

***Majority teach political science, social science, and psychology.

****Includes one totally blind.

*****Majority are totally blind.

Source: NYS Commission for the Blind, Albany. Data are appoximate since not all blind persons are known to the Commission.

TABLE II-2

STUDENT MAJORS - MATRICULATED GRADUATE AND UNDERGRADUATE

CITY COLLEGE - FALL 1974

MAJOR AREA	GRADUATE	UNDERGRAD
HUMANITIES		
Area Studies	18	7
Communications	-	25
Fine Arts	86	219
Foreign Languages	85	99
Language Arts (Letters)	260	306
Philosophy	6	-
EDUCATION		
All Specialties	1429	658
SCIENCES AND ENGINEERING		
Biological and Biomedical	55	430
Computer Science	59	129
ENGINEERING		
All Specialties	212	915
HEALTH PROFESSIONS		
All Specialties	-	345
Mathematics	84	123
PHYSICAL SCIENCES		
All Specialties	93	185
Home Economics	-	-
Library Science	-	-
Architecture	-	327
SOCIAL SCIENCES		
Business and Management	-	-
PUBLIC SERVICE		
All Specialties	45	-

TABLE II-2 (Continued)

MAJOR AREA	GRADUATE	UNDERGRADUATE
PSYCHOLOGY		
General and Industrial	50	347
SOCIAL SCIENCES		
All Specialties	164	602
INTERDISCIPLINARY	-	-
NO SPECIFIC SUBJECT AREA	-	1466
TOTAL	2601	6228

Source: BHE DATA BOOK Part "C". Tables VII and VIII, Fall, 1974.

SUMMARY TABLE - TABLE II-3

Humanities[a]	455	656
Education and Psychology	1479	1005
Science and Engineering	503	2454
Social Science[b]	164	647
No Area Names	-	1466
TOTAL	2601	6228

[a] Visually impaired and blind students included in above figures.

[b] Psychology grouped with education rather than social science.

Source: Table II-2

TABLE II-4

PERIODICALS AVAILABLE NATIONALLY THROUGH DBPH OR PURCHASE FROM PUBLISHER BY CATEGORY

(Professional Titles as % of Category)

Category	# Titles	Professional titles	% Of Category
Adult Gen'l. Int.	30	-	-
Children's	14	-	-
Religion	44	-	-
Special Int.	28	2 Education	7
		1 Language	3
TOTAL	116	5 Rehab and Health	17
		1 Computer	3
Professional Titles as percent of Special Interest			32
as percent of all available titles			7.75%

Source: Reference Circular Magazines, DBPH

TABLE II-5

SAMPLE OF PERIODICALS AVAILABLE THROUGH DBPH

NEW YORK CITY REGIONAL BRANCH

PERIODICAL	# OF READERS	FREQUENCY	TOTAL # COPIES
Better Homes and Gardens	22	12	264
Blind Data Processor*	11	6	66
National Geographic	40	12	480
Psychology Today*	41	12	492
American Girl	13	12	156
Boy's Life	7	12	84
Braille Chess	10	4	40
Braille J. of Physiology*	8	12	96
Braille Mirror	28	12	336
Braille Music	17	12	204
Braille Variety News	48	12	576
Children's Digest	9	12	108
Jack and Jill	9	12	108
Consumer Reports	23	12	276
Fortune	21	12	252
Horizon	6	4	24
J. Rehabilitation*	11	6	66
Galaxy	12	6	72
Todays Health	46	12	552
Playboy	36	12	432

TABLE II-5

SAMPLE OF PERIODICALS AVAILABLE THROUGH DBPH

NEW YORK CITY REGIONAL BRANCH

PERIODICAL	# OF READERS	FREQUENCY	TOTAL # COPIES
New Beacon	5	12	60
TOTAL	414		4252

*Professional Journal

Estimated Price is $38. per reader for a volume.

Source: L. Redmond, DBPH

LC 73-102b (4/68)

COPYRIGHT REQUEST PERMISSION

Publisher: ____________________

Author: ____________________

Title: ____________________

Edition: __________ Publication Date: __________

☐ Tape ☐ Braille ☐ Large Type

Organization	Requisition Date

Complete and Return to Division for the Blind and Physically Handicapped, Library of Congress, Washington, D.C. 20542.

III-1

BRAILLE USERS' GUIDE AND PROGRAMMERS' MANUAL

The following is a program manual for the demonstration program. Functionally, there are five modules, each composed of several subroutines, which operate as independent tasks. The following description is organized on a functional basis, in execution-sequence.

MODULE SUMMARIES

Module Main. This module is entered upon completion of the compilation and loading routines of the Operating System. Function: Performs initialization of PL/1 environment. Initially sets up common data blocks for use by logon procedure. Performs communication function between the user and the subtasks, and synchronizes the operation of the subtasks in the system.

Modules called: Editor, Catalog, Hebrew, Dotpar.

Internal Procedures called: Logon, Continu, Process, Resume, and Validate.

The following commands are provided. Editor, short form E, calls the tutorial program that explains the text editing symbols required by DOTSYS3. Catalog, short form C, calls the Catalog program that creates, modifies and searches the database. Hebrew, short form H, calls the Hebrew Braille Translator. DOTSYS short form D, calls the DOTSYS3 Braille translator via an assembly language linkage. Dynamic compilation and execution are provided for, as is choice of language tables; the only language supported at this time is English. When the multilanguage facility is implemented by sets of translation tables, the forms DOTSYS, Language and D, Language should be used. Help, short form ?, causes the repertoire of commands to be displayed. CR (which is implemented as a blank followed by a carrier return causes an interrupt of command and the operator has the chance to either end the session or continue processing by typing an appropriate command. GO, short form G, resumes command processing. Quit, short form Q, terminates the session, and control is returned to the Operating System.

Logon. Function: Checks users to see if they are authorized to use the system. For System Programmer and certain supervisors sets a bit to enable write access to the catalog. All others only have read access to the catalog. In addition, System Programmer may update or modify the characteristics of authorized users.

Caller: Main.

User input Name (30 characters), ID 10 characters, (numeric), User Job Title (30) characters, password (30 characters) and except for System Programmer are implementation defined.

Returns: Security bit 0 or 1 to be checked by catalog program.

Files Used: SYSIN, SYSPRINT preferable a graphics console.

Continu. Function: Displays commands and command formats.

Caller: Main, Validate if command verification error, Process in response to Help or ? command.

Files Used: SYSPRINT.

Resume. Function: Prompts for user command input.

Caller: Process.

Returns: 6 character command string.

Files used: SYSIN, SYSPRINT.

Validate. Function: Checks command string obtained from Resume against lists of short or long commands. If command string is valid, it is assigned to a string variable and passed to entry Rocess if it is a long command, or to entry Ocess if it is a short command. Otherwise the message ***command in error. Retype. III is displayed upon SYSPRINT, and Continu is called to display the valid commands.

Caller: Process.

Calls: Continu.

Returns: Command string.

Files used: SYSPRINT.

Process. Function: Command processor. For Edit, Hebrew, Catalog, and Dotsys, calls the appropriate subtask and then waits for completion of the called task. For Help, Go, and Blank, the appropriate text is output. Process is called repeatedly until Quit is issued, which causes a message to be printed, and terminates execution.

Caller: Main, Process.

Calls: Resume, Continu, Validate, Editor, Hebrew, Catalog, Idotpar, and Process.

Files used: SYSPRINT.

Editor. Function: Teaches the user the editing symbols and conventions required for text preparation for DOTSYS. The following subcommands are provided, each either giving an example to be worked out by the user, or stating a rule if it is not feasible to give an example.

Function codes are as follows:

0. Print termination message and return to caller.
1. List all control codes.
2. Capitalization codes and examples.
3. Italic codes and examples.
4. Contraction forcing codes and examples.
5. Quote mark codes and examples. Quotation mark is not valid symbol for program. Use apostrophe either singly or doubly as required.
6. Accent code.
7. Bracket codes.
8. Poetry codes. (for scansion).
9. Null (i.e., inhibit) contraction and blank insertion codes.
10. Termination code.
11. Paragraph, line and page codes.
12. Tab codes (for setting margins or columns).
13. Title and Heading delimiter codes.
14. Poetry start and end codes. To delimit text.
15. Octal and computer braille codes.
16. Letter sign code.
17. Self-check feature codes.

The program cycles through a segment dealing with each function as long as the code dealing with that section of editing symbols is given. The following modules actually perform the functions described above.

Module Editor. Function: Tutorial program subtask.

Pagel. Function: Displays function codes as illustrated above.

Caller: Editor, Teach.

Files Used: Console.

Enter. Function: Command code and character string input.

Caller: Editor, Teach (all entry points).

Passed: single bit with value 0 for entry of command codes, 1 for entry of a character string.

Returns: Command code or character string depending on value of bit passed by caller.

Files used: Console, Keyboard. (aliases for SYSIN, SYSPRINT).

Teach. Function: Displays appropriate examples to user depending on command code typed. Evaluates responses typed by user.

Caller: Editor, Teach (internal entry points for command codes).

Calls: Enter with a value of 1, Cycle.

Files used: Console, Keyboard.

Cycle. Function: Prompts for next command.

Caller: Teach.

Calls: Enter, with a value of 0.

Returns: Command code.

Files used: Console, Keyboard.

Posts: Event variable 1, upon receipt of 0 command code and returns to Caller: Process.

Module *Hebrew*. Performs Hebrew Braille Translation.

Caller: *Process*.

Calls: *Monitors*, *Inpugsec*, *Prog*, *Outsect*, *Errorsec*, *Editor*, *Instrace*, *Tracex*, *Exit* (secondary entry point).

Returns: Completion code of 0 (no errors), 4 (endfile) or 16 (*Errorsec* was entered) to Caller.

Posts: Event variable E3.

Monitors. Function: Modify PSW upon interrupt to enter entry *Exit* in *Hebrew*. Return code of 16 loaded into GPR15.

Caller: All of the following processing modules. *Prog*, *Outsect*, *Editor*.

Passed: Control information pointed to by GPR1.

Returns: Return code of 16.

Inputsec. Function: Opens input file, reads a record, closes the input file upon completion. At end of file loads a return code of 4 into GPR15.

Caller: Hebrew.

Calls: Correct. (Input error only)

Returns: Input from cards is stored in *Datasect*, an external data area. Return code of 0 if not last record, 4 upon endfile.

Files Used: Reader (alias for SYSIN).

Prog. Function: Translates input text from card code (Hebrew EBCDIC), moves the translated text to a buffer in the data area, and loads the address of the data buffer into GPR11, and GPR1.

Caller: *Hebrew*.

Passed: Address of text in GPR4.

Returns: Address of translated text in GPR11, and GPR1.

Editor. Function: Formats the translated text by stripping off the two high order bits, and taking the remaining bits two at a time, builds the lines to be printed. The printer can only print a line at a time, so the braille cells have to be split into thirds. When a line of 132 print positions is filled, the addresses of the three buffers are put into a list, and the address of the first item on the list is put into GPR1; the address of the last item is OR'ed with 2^{32}, putting a one bit in the high-order position, signifying the end of the list.

Caller: *Hebrew*.

Passed: Address of translated text in GPR1.

Returns: Address of print buffer list in GPR1

Outsect. Function: Printing of buffers of text and spacing.

Caller: *Hebrew*.

Calls: *Correct*. (Output errors only)

Passed: Address of list of print buffers in GPR1.

Returns: No parameters returned. If printer not opened successfully, address of error return is loaded into GPR14.

Files used: Printer, Alias for SYSPRINT.

Correct. Function: I/0 error analysis.

Caller: GET/PUT. QSAM I/0.

Passed: Address of Indicators in GPR11, Access method code in GPR12.

Files Used: T. (Alias for SYSPRINT)

Errorsec. Function: Requests SNAP dump from Operating System.

Caller: Hebrew. (entry point EXIT).

Returns: Return Code 16 in GPR15.

Files used: S. (Alias for SYSPRINT)

Datasect, Function: Data area.

Caller: Not called; referred to by address constants.

Contains data used by all modules of program, no executable code.

Module Idotpar. Function: Performs dynamic linkage to COBOL Compiler, Linkage Editor, and object code of DOTSYS. Compilation and Linkage Editing of DOTSYS are restricted functions. Compilation of DOTSYS when it already exists in executable form and execution of DOTSYS dynamically when it has not been compiled Control cards for DOTSYS and text may be entered. The information required for control cards will be formatted.

Control cards supported at the present date are those for DOTSYS II.

Caller: Process.

Calls: Greet, Card, Request, Prompt, Closer, Attach.

Posts: Event Variable E4.

Greet: Function: Prints messages, opens file for storing Control card images for DOTSYS.

Caller: Idotpar.

Files used: Console (Alias for SYSPRINT), KBD (Alias for SYSIN),
Cardinput. (Should be blocked 21, record length is 80)

Card. Function: Prints messages describing control card parameters, if N is zero prints all messages. Otherwise prints the Nth message only.

Caller: Idotpar, Check.

Passed: N.

Files used: Console.

Request. Function: Input of user commands.

Caller: Idotpar, Check.

Calls: Prompt.

Passed: 1 bit parameter determining what type of information is to entered. One indicates characters. Zero indicates numbers. The other parameter indicates return point. Zero indicates return to Prompt.

Returns: Number or Character string.

Files used: KBD, Console.

Prompt. Function: Calls check to process another card.

Caller: Request, Idotpar.

Calls: *Check*, *Prompt*.

Check. Function: Checks information passed by *Request* and formats control cards. Writes control-card images to disc.

Caller: *Prompt*.

Calls: *Error*, *Card*, *Request*.

Passed: N. (Card Number)

Passes: DDD, BBB to *Request*. BB to *Error*.

Returns: Corrected and formatted card images written to disc.

Files used: KBD, Console, Cardinput.

Error. Function: Prints error messages.

Caller: *Check*.

Passed: BB .(01 error in character string; 10 line width error; 11 page size error)

Returns: BB reset to 00.

Files used: Console.

Closer. Function: Closes (and rewinds) *Cardinput*. Prints completion message.

Caller: *Idotpar*.

Files used: Console, Cardinput.

Attach. Function: Dynamic invocation of COBOL Compiler, Linkage Editor, or compiled and executable version of DOTSYS.

NOTE: The JCL normally required for a COBOL Compilation and Linkedit job must appear in the JCL of the "Go" step. DDNAMES specifying "COB" or "LKED" should be changed to specify "GO". Distinction should be made between the statements "SYSLIB" in steps "COB" and "LKED", since they are not the same dataset. The program listing for the batch execution of DOTSYS shows the proper JCL.

Caller: *Idotpar*.

Calls: *Inproc*, *Elink*, *Link*.

Passes: J a one digit return code.

Commands: The Compile command is 'C,1; the execute command is 'E'..

Files used: KBD, Console, files required by COBOL compiler, Linkage Editor and COBOL Program.

Return Codes:
0 Compilation error.
1 Linkedit error.
2 Reserved.
3. Execution successful.
4. Execution failed.

Inproc. Function: Prompts for user command input.

Caller: *Attach*.

Passes: 3 character command as described above.

Files used: KBD, Console.

Link. Function: Dynamic compilation and linkedit of DOTSYS. See note above on JCL.

Caller: *Attach*.

Calls: IKFCBLOO (COBOL Compiler).
IEWL (Linkage Editor).
(Linkage editor called only if compilation successful).

Passed: J.

Returns: Retur codes as described above.

Step Completion code in GPR15.

Files used: Standard DDNAMES for Compilation and Linkage Edit.

Link. Function: Dynamic Execution of DOTSYS.

Caller: Attach.

Calls: DOTSYS3.

Passed: J.

Returns: Return codes of 3 or 4 as described above.

Step Return Code in GPR15.

Files used: SYSIN, SYSPRINT, SYSRPQ, SYSBRL, SYSMEMB.

Module Catalog. Function: Creates and maintains a Master Catalog file arranged in ISBD(S) format, and a file of analytic entries describing articles in the items in the MCF. The following functions are supported.

AU Author name of author	Author search.
TI Title title	Title search.
SU Subject subject	Subject search.
SR SRCH author title	Combined author/title search.
KO Kwoc	Kwoc index.
KI Kwic	Kwic index.
? Help	Display command formats
SO Sort File parameter	Sort a file
CO COORD	Maintain and manipulate coordinate index.
SL Shelf Add DDC or LC	Add new items to MCF (protect bit must be 1)
List DDC or LC	Sort MCF by call number and print call number and title.
Q Quit	Terminate catalog processing.

Caller: Process.

Calls: Titlep, Authp, Subjp, Srchp, Kwicp, Kwocp, Sortp, Coordp, Slist, Quitp, Helpp, Opener, Display, Reader, Validate, Errors.

Passed: Sec (security Bit); 1 modify privaleges, 0 read access only.

Returns: If user tries to modify MCF or index without proper access. Subcommand is aborted at time of decoding.

Files Used: SYSIN, SYSPRINT, MCF, Analyt.

MCF contains complete bibliographic information.

Analyt contains title, author, page, date, number, accession number, call number, and up to six keywords.

Posts: Event variable E2.

Opener. Function: Opens files. Prints messages and error codes. Onfile- file which could not be opened. Oncode- type of error.

Caller: Catalog.

Calls: PLIRETC. Return code of 16 is passed.

Passes: Return code.

Returns: Error return if files cannot be opened.

Files used: SYSIN, SYSPRINT, MCF, ANALYT.

Display. Function: Prints information concerning commands, and a command listing, if listing suppression is not in effect.

Calls: Enter.

Passes: Opt, an 80 character string.

Returns: If opt is *s without printing commands and their formats.

Files used: SYSPRINT.

Caller: Catalog, and command processing modules upon error.

*F being assumed.

Enter. Function: User display option input.

Caller: Display.

Passed Opt.

Returns: *S for short listing- no command formats.
*F for full listing.

Files used: SYSIN, SYSPRINT.

Reader. Function: Command input and separation.

Caller: Catalog, Slist, Format, Allocate.

Calls: Separate.

Passes: Action, a one by four character array which contains a command and up to three parameters.

P1, P2, P3, Cmnd- The first three hold parameters, the last holds the command.

Request, the 80 character user command request.

Returns: As above, the request having been broken down into Command and parameters.

Files used: SYSIN, SYSPRINT.

Separate: Function: Separate command request into command and parameters so it can be executed by a processor.

Called: Reader.

Returns: Action.

Validate. Function: Validation of user commands..

Caller. Catalog.

Passed: Action, Flags, a 40 element 1 bit array, used to check status of processor activities.

Returned Prc 1 bit, set equal to 1, Flag(5) set.

If command not valid, then Prc is set, but Flag(5) is reset.

Commands are now executed if they are valid. Procedure entry points are taken from Command(I,4), Command (I,1) contains the short command, Command(i,2) contains the long command, Command (I,3) is presently reserved. If Validate returns normally, the proper procedure is executed. Otherwise, Errors is called to print a message, and the command listing is displayed with the *F option. A correct command now can be entered. This process continues until the Quit command is entered, which posts event variable 4 and terminates execution. The following text describes the second-level command processing modules. Most of these have their own subcommand structure.

Errors.. Function: Prints error messages.

Caller: Catalog (command decoding), Processing modules, I/O Modules.

Passed: Error number, Flag number of calling module, Endfile indicator, valid only for I/O errors.

Returns: If both the flag referenced and the endfile indicator are reset, a message indicating a non-I/O error is printed. If the flag is on, an informative message is printed. If the endfile indicator is on, and the flag should be off, an endfile message is printed, in addition to the message the calling program requested.

Files used: SYSPRINT.

Helpp. Function: Causes full command listing to be printed.

Caller: Catalog.

Calls: Display.

Passes: listing type indicator '*F'.

Slist. Function: update or read the MCF to provide a call number-title shelflist. Protect bit (set by logon procedure and valid for implementation defined job titles), should be on for modification of shelflist (i.e., MCF and ANALYT), specifically the "Add" parameter of the Shelf command.

Caller: Catalog.

Calls: Errors, Reader, Format, Allocate, Reader2, Print.

Passes: Error numbers 20-25, depending upon place.
Flag (14), Periodic, Serial and Analytic, Action, Eof, Eof2, Blank.

Returns: After completion of subcommand or upon endfile, Event variable 2 being posted.

Files used: SYSIN, SYSPRINT, MCF, ANALYT.

Format. Function: Prints format of catalog entry in MCF.

Caller: Slist.

Calls: Reader.

Passes: Action Book, serial or * are the only commands allowed.

Files used: SYSPRINT.

Allocate. Function: Sets up and fills a new catalog entry.

Caller: Slist.

Calls: Errors, Filler, Reader, Allocate, Enter.

Passes: Opt, Flag(number), Error(number), Periodic, Serial.

Returns: Completed catalog entry written to disc.

Files used: Does not do any I/O.

Filler. Function: Fills a catalog entry.

Caller: Allocate.

Calls: Errors, Enter, Reader4, Xfr.

Passes: Error(number), Flag(number), Opt, Periodic, Serial.

Returns: Completed catalog entry in buffer.

Files used: Does not do any I/O.

Reader4. Function: Assigns accession numbers and converts user input into a catalog entry. Prompts for each field of entry.

Calls: Filler2, Messag.

Caller: Filler.

Passed: Periodic, Flag(number).

Passes: Periodic, Flag(number), NNNN (a message number).

Returns: Catalog entry in buffer, ready to be written to disc.

Files used: Does not do any I/O.

Filler2. Function: Prompts and fills buffer for catalog entry.

Caller: Reader4.

Calls: Enter1, Enter, Messag, Print.

Passes: Opt, NNNN, Periodic, Parm1.

Parm1 is the description of an entry i.e., call number.

NNNN is a message number. See description of terminal session following this section for usage, and list of messages at end of section for messages and numbers.

Returns: Called recursively until buffer is filled.

Files used: SYSPRINT.

Enter1. Function: Secondary entry point to Filler2.

Caller: Filler2.

Calls: Filler2.

Passes: NNNN, request to print message(NNNN).

Messag. Function: Prints indicated message.

Caller: Filler2.

Passed: NNNN.

Files used: SYSPRINT.

Print. Function: Prints part of an entry.

Caller: Slist, Authp, Titlep. Subip, Srchp.

Passed: Periodic, or Serial, Blank.

Printed field of structure is denoted by Blank, i.e., Place1.

If blank is null, call number and title are printed.

Files used: SYSPRINT.

Xfr. Function: Moves completed entry to buffer area, and writes it to disc.

Caller: Filler.

Passed: Serial, Periodic, E, Flag(number). E is 1 bit, set if serial.

Files used: MCF.

Quitp. Function: Prints termination message, posts event variable 2.

Caller: Catalog.

Passed: Event variable 2.

Returns: Event Variable 2, set.

Files used: SYSPRINT.

Titlep. Function: Performs title search for a periodical in the MCF. Also performs title search of the file of transcribed articles.

Caller: Catalog.

Calls: Reader2, Errors, Print.

Passed: Serial, Analytic, Flag, Error(number), Eof, Eof2, Action.

Passes: All above parameters.

Returns: Printed copy of catalog or analytic file entry.

Files used: Does not perform any I/O.

Authp. Function: Performs author search of analytic file.

Caller: Catalog.

Calls: Reader2, Errors, Print.

Passed: Action, Flag, Analytic.

Passes: Error(number), Flag, Analytic, Eof, Eof2.

Returns: Printed copy of analytic file entry, or error message if not in file.

Files used: Does not perform any I/O.

Subjp. Function: Performs subject search of MCF or analytic file.

Caller: Catalog.

Calls: Errors, Reader2, Print.

Passed: Action, Flag, Serial, Analytic, Error(number), Eof, Eof2.

Passes: All of above parameters.

Returns: Printed copy of all MCF or analytic file entries on the specified subject.

Files used: Does not perform any I/O.

Srchp. Function: Verify an article in the analytic file given an author and title.

Caller: Catalog.

Calls: Errors, Reader2, Print.

Passed: Error(number), Flag, Analytic, Eof, Eof2.

Returns: Printed copy of entry in analytic file.

Files used: Does not do any I/O.

Reader2. Function: Reads a record from a designated file into a designated buffer.

Caller: Authp, Titlep, Srchp, Subjp.

Passed: Serial, or Analytic, MCF or AF, Eof2 or Eof3, Flag(number).

Returns: Next record from file; sets flag vit. If last record has been read, Eof2 or Eof3 is set; in this case no record is returned. The Caller checks the flag bit and requests the printing of a message.

Files used: MCF, AF (Record oriented sequential files).

Coordp. Function: Maintenance, Creation, and Searching of a document-on-term oriented coordinate index. Functions provided are: Terms- Show list of terms and term numbers.

Add- Add a new document and update indexes.

Coordin- Enter a search request. The search ligic is organized so that each term contains a reference to the documents that contain that term. Logical operations on terms correspond to coordination of terms and documents.

Exot- end index processing.

Calls: Terms, Add, Coordin, Exit, Reader3.

Passed: Accession number, journal title.

Returns: List of terms and term numbers.

List of Documents satisfying a search request.

Files used: SYSIN, SYSPRINT, AF, DOCS.

Terms. Function: Print list of terms in system and their numbers.

Caller: Coordp.

Returns: List of terms and term numbers.

Files used: SYSPRINT.

Add. Function: Creation of a new entry in AF; Addition of terms to list of terms; addition of new entry numbers to items file.

NOTE: Items must already have been translated into machine readable form before they are indexed. If this is a new journal, a new items file entry must also be created. Use the Title command with the J option, before adding items to the index.

Caller: Coordp.

Passed: Current accession number for old title; zero for new title.
Current item number for old title; 1 for new title.

Passes: New entry to be written to AF.

Files used: SYSIN, SYSPRINT, AF, MCF.

Coordin. Function: Evaluates a user request given in terms of terms and logical operators. The result of the evaluated request is searched for a one bit and the position in which the bit occurs is returned as a document number.

Caller: Coordp.

Returns: List of documents satisfying search request.

Files used: SYSIN, SYSPRINT, AF.

Exit. Function: Terminates index processing, prints error or other termination message, and returns to caller.

CALLER: <u>Coordp</u>.

Calls: <u>Catalog</u>.

Files used: SYSPRINT.

The following is indicative of the type of response a typical user should have from the system. Not all commands are shown, and no commands that would modify the database files are shown. Capitals indicate responses by the system.

```
****BRAILLE3 TRANSLATION SYSTEM 760901 225930999****

****TYPE LAST NAME SOCIAL SECURITY NUMBER AND JOB

    TITLE SEPARATED BY BLANKS****

****IF NAME OR JOB CONTAINS SPECIAL CHARACTERS ENCLOSE

    IN SINGLE QUOTES****

    michel 0000000000 systemdesigner test
    (system does not echo your reply; depending on your reply
    one or more of the following messages will appear)

****NAME OF USER NOW LOGGED ON****
    (logon successful)
****UNABLE TO LOG USER ON****
    (logon failed- typing error see following messages)

****NAME NOT RECOGNIZED****

****ID NOT RECOGNIZED****

****JOB NOT RECOGNIZED****

****USER REPLY echoes reply NOT RECOGNIZED BY SYSTEM****

                (user is not an authorized user)
```

(If you get any of these messages besides the first or the last, the system will recycle and the logon procedure will repeat itself; If you were refused as an authorized user because your profile is not in the system, get authorizatio, and the system manager will insert your profile into the system.) (The body of the terminal session shows use of the EDITOR, calling DOTSYS and the use of the CATALOG.)

```
(SYSTEM PRINTS LIST OF VALID COMMANDS FOR PROCESSORS)
?  (Monitor prompt character- enter command)
          e.  (Calls for the EDITOR
          PLEASE ENTER YOUR NAME
          moshe
          (SYSTEM LISTS EDIT SUBCOMMANDS)
          =  (Prompt character-enter command)
          2  (capitalization codes)
          TYPE ALLCAPS FOR WORD COMPLETELY IN CAPS
          TYPE INITCAPS FOR INITIAL CAPITALS
          initcaps
          THE = IS THE CAPITAL LETTER SIGN
          TYPE 0 TO STOP 1 FOR CODES OR CODE DESIRED
          0
          ****SESSION TERMINATED BY USER****
          (end of edit session)
          ?
          0   (Calls the CATALOG)
          ****CATALOG AT YOUR SERVICE****
          FOR SHORT COMMANDS TYPE *S
          FOR LONG COMMANDS TYPE *F
          *S SUPPRESSES COMMAND LISTING
```

```
*F ASSUMED AFTER ERROR

HELP ASSUMES *F.

?

*S

?

TITLE QST   (title requested to be searched)

ENTER ARTICLE FOR ARTICLE TITLE

ENTER BLANK FOR JOURNAL TITLE

      (Journal title requested)

QST     (Title and accession number if in system)

***EOF ON MCF TITLE****   (Title not in system)

***ENTER A BLANK TO CONTINUE***

***ENTER HELP OR ? FOR CODES OR R TO RETURN***

#

R

coord    (work with the coordinate index)

COORDINATE INDEX AT YOUR SERVICE

ENTER 'TERMS' TO SHOW TERMS IN SYSTEM

ENTER 'ADD' TO ADD A NEW DOCUMENT

ENTER 'COORDIN' TO MAKE A SEARCH REQUEST

ENTER 'EXIT' TO END SESSION

   # terms

   ***LIST OF CURRENT INDEX TERMS IN SYSTEM***

(SYSTEM LISTS TERMS AND TERM NUMBERS)

# (Prompt character=enter command)

coordin
```

```
xxxx (number of term radio) or yyyy (number of term regulations)
(SYSTEM PRINTS DOCUMENT IDENTIFICATION OF DOCUMENTS SATISFYING
REQUEST)
****NO DOCUMENTS SATISFY REQUEST****
(There are no documents satisfying the request in system)
exit
***INDEX PROCESSING SESSION ENDED***
***SESSION ENDED BY USER***
?
Q
(end of session)
?
D     (call DOTSYS)
e
****EXECUTION FAILED****
(error while doing translation)
***TRANSLATION COMPLETE TYPE C OR CATLG TO
UPDATE THE CATALOG****
(successful execution)
?
quit
***SESSION TERMINATED BY USER***
(end of terminal session)
```

NOTE: Use CPY command to copy and concatenate text to be translated with tables being used by DOTSYS. It should be issued before "E" command.

MESSAGES

The following is a listing of messages issued by various components of the BRAILLE3 TRANSLATION SYSTEM. Messages are arranged by program issuing them; appropriate system action and user response is given for each message. T indicates a message that will cause a component to either not be executed, or its execution to be aborted. Most programs continuously cycle through a command until the user types it correctly. These messages are flagged E. I indicates the message contains information about the status of a user request or program. A indicates some action is required, usually these are requests for information from the user.

BRAILLE3 TRANSLATION SYSTEM yymmdd hhmmsstt ** (I)

LOGON- System has been started in response to request to have the system executed. Date is year, month, day; the time is hours, minutes, seconds, thousandths of a second.

Response: None. Further LOGON messages follow.

TYPE LAST NAME SOCIAL SECURITY NUMBER AND JOB TITLE SEPARATED BY BLANKS
IF NAME OR JOB CONTAINS SPECIAL CHARACTERS ENCLOSE IN SINGLE QUOTES (A)

LOGON-Request for user to log on. System prompts '&'.

Response: Enter information requested.

NAME NOW LOGGED ON TO BRAILLE3 yymmdd hhmmsstt

LOGON- User has been logged on to BRAILLE3. (I)

Response: None

UNABLE TO LOG USER ON (I)

LOGON- Part of user logon request unrecognized. LOGON TERMINATED.

Response: None. See following messages for details.

NAME NOT RECOGNIZED (I)

LOGON - Name specified by user does not match name stored by system.
Restarts LOGON procedure.

Response: None. LOGON will be restarted.

ID NOT RECOGNIZED (I)

LOGON- User ID does not match ID for this user in system.

Response: None. LOGON will be restarted.

PASSWORD NOT RECOGNIZED

LOGON- User specified unrecognizable password

Response: None. LOGON will be restarted.

JOB NOT RECOGNIZED (I)

LOGON- Job title specified by user does not match job in system.

Response: None. LOGON will be restarted.

USER REPLY name id job password NOT RECOGNIZED BY SYSTEM (T)

LOGON- User whose request is displayed is not an authorized user..
LOGON is abnormally terminated.

Response: See system administrator for user authorization.

TYPE U TO UPDATE USERS (A)

LOGON- System administrator is given option of updating user profiles.
Information is changed as requested and new list is printed.

Response: Reply "U" for this option; any other single character to bypass.

SECOND COMMAND FORM IS SHORT FORM (I)

CONTINU- Notification to user of short command option. Lists valid commands and their formats.

Response: None.

? (A)

RESUME- Prompt character- enter a command.

Response: Enter a monitor command.

COMMAND command IN ERROR. RETYPE (E)

VALIDATE- Command displayed is not recognized. List of commands will be displayed. User may make another selection

Response: When prompted by a "?" enter another command.

SESSION TERMINATED BY USER yymmdd hhmmssttt* (I)

PROCESS- User entered a Q or QUIT command. BRL3 returns to OS.

Response: None.

****SESSION TERMINATED BY USER**** (I)

EDITOR-Program returns to caller. User typed '0'

User response: None.

TYPE 0 TO STOP 1 FOR CODES OR CODE DESIRED (A)

CYCLE-Preceeding command has finished.

User Response: Enter appropriate command when prompted.

'='

ENTER- Prompt character.

User Response: Enter an EDITOR command.

ENTER NEXT CARD (A)

REQUEST-Card previously entered has been formatted.

User Response: Enter appropriate parameters for card when prompted.

'*'

REQUEST- Prompt character

User Response: Enter parameters for card.

OPTION option INVALID (E)

TRY AGAIN

ERROR-Option specified is invalid for card being processed. User will be told valid options for present card.

User Response: Respond to messages when re-issued.

LINE WIDTH EXCEEDED (E)

ERROR- Line width was less than 2 or greater than 40.

User Response: Respond to messages when re-issued.

LINES/PAGE EXCEEDS LIMIT (E)

ERROR- Lines per page is greater than 25.

User Response: Respond to messages when reissued.

OPTION CARDS SUCCESSFULLY COMPLETED (I)

CLOSER-Control cards as specified for DOTSYS3 have been successfully processed. File containing these cards is closed.

User Response: None. NOTE: Text to be translated must be added to the end of this file. The file should then be concatenated to the file containing the tables for DOTSYS3. See the operating and maintenance instructions for information on how to do this using batch mode. Use the CPY command to do it dynamically from your terminal. This must be done before dynamically executing DOTSYS.

TYPE C TO COMPILE E TO EXECUTE CPY TO COPY TEXT (A)

ATTACH-Enter appropriate command. CPY should be entered before E.

User Response: C command should only be used by system manager when installing DOTSYS. It must be followed by a comma and a 1.

CPY is used to copy locally entered or text on tape (not in braille, but edited) onto the end of the file that contains the control card images for DOTSYS3. A system utility then adds the file CARDIN to the end of the file TEMP, containing the tables for DOTSYS3, the E command may now be specified to translate the text.

Files are as specified in the operating instructions.

LINK TO COBOL ENTERED (I)

ATTACH- The COBOL Compiler is currently compiling DOTSYS3.

User Response: None.

COMPILATION FAILED

ATTACH- Cobol Compiler returned a non-zero return code that was greater than four.

Programmer response: Correct errors and recopy tape.

User Response: See your programming consultant-should not occur.

LINKEDIT FAILED

ATTACH-Linkage Editor returned a return code that was greater than 4.

User and Programmer response: See Preceeding Message.

EXECUTION FAILED* (T)

ATTACH- DOTSYS program did not find set of tables before text.

User Response: Check to see that CPY command terminated normally. If it failed, recreate the dataset and rerun using CPY and E commands. Offline, check to see that IEBENER did not fail. Recreate text dataset.

TRANSLATION SUCCESSFULLY COMPLETED. RUN CATLG TO UPDATE* (I)

ATTACH- Text was successfully translated.

User Response: Use the CATALOG to update the databases including entries for the newly translated text.

****COPY SUCCEEDED**** (I)

ATTACH- A copy action to prepare text for DOTSYS completed normally.

User Response: None. Issue E to run DOTSYS.

****COPY FAILED**** (I)

ATTACH- A requested copy action failed.

User Response: Check and see that there were no errors in specifying the files to be copied. The destination file should be CARDIN. Also check and see that the utility program did not terminate abnormally. Correct any errors and restart the copy process.

****DOTSYS EXISTS**** (I)

ATTACH- User entered C command. DOTSYS has already been compiled. Command is ignored.

User Response: Enter CPY and then E commands.

DOTSYS NOT IMPLEMENTED YET (I)

ATTACH- User entered E command. Teh status bit was zero indicating DOTSYS wither was not in the system, or was not compiled successfully. Command is ignored.

User Response: If you have appropriate privileges, enter C to compile DOTSYS. Otherwise see your system manager.

* (A)

INPROC- Prompt character- enter command.

User Response: Enter C,1, CPY or E command as appropriate.

NOTE: Most messages issued by the CATALOG module reside in data areas that are accessed by routine ERRORS which actually prints the error messages. When a name of a routine is listed, it is the one that requested an error message.

UNABLE TO OPEN FILES. SEE OS MESSAGES FOR DETAILS (T)

OPENER- It was impossible to open files required for catalog processing. The error code generated by compiled code and the name of the undefined file are printed.
Check OS Messages for futher details. CATALOG processing abnormally terminated.

User Response: Add or correct DD statements for the file(s) in error.

FILES OPENED SUCCESSFULLY (I)

OPENER- Files were successfully opened.

User Response: None.

COMMAND NOT RECOGNIZED (I)

CATALOG- VALIDATE returned a Flag(5) value of zero. The command is not in the system. System displays list of valid commands and turns on the full command listing option. User is prompted for a new command.

User Response: Enter a valid command when prompted.

TITLE MISSING CANNOT SEARCH (E)

TITLEP- No title was specified in a TITLE command. TITLEP returns.

User Response: Enter a TITLE command specifying a title parameter.

EOF ON MCF (I)

TITLEP- End of file reached on the master catalog. Title requested is not in system.

User Response: None.

ENTER A BLANK TO CONTINUE R TO RETURN (A)

TITLEP- a title has been processed. Are there more items to be processed? System awaits reply.

User Response: Respond as indicated.

ENTER HELP OR ? FOR CODES (A)

TITLEP- SYSTEM finished processing. User entered invalid code.

User Response: Respond as indicated.

AUTHOR MISSING. CANNOT SEARCH* (I)

AUTHP- User entered an AUTHOR command and did not specify an author.

User Response: Reissue the Author command, specifying an author.

*** EOF ON AF AUTHOR**** (I)

AUTHP- The author is not listed in the Analytics file.

User Response: None.

ENTER BLANK TO CONTINUE R TO RETURN (A)

AUTHP- Author request has been processed.

User Response: Respond as indicated.

ENTER HELP OR ? FOR CODES (A)

AUTHP- Reminder to user about codes in system.

User Response: Enter appropriate response.

SUBJECT HEADING MISSING. CANNOT SEARCH (I)

SUBJP- Subject command issued without subject heading.

User Response: Reenter subject command with a subject heading.

EOF ON MCF SUBJECT (I)

SUBJP- The requested subject heading is not in the MCF.

User Response: None.

ENTER BLANK TO CONTINUE R TO RETURN (A)

SUBJP- Subject request processed.

User Response: Respond as indicated.

ENTER HELP OR ? FOR CODES (A)

SUBJP- Reminder of codes in system.

User Response: Respond as indicated.

AUTHOR OR TITLE MISSING. CANNOT SEARCH (I)

SRCHP- SRCH command issued without both an author and a title.

User Response: Reissue SRCH command specifying an author and a title.

EOF ON AF SEARCH (I)

SRCHP- Author and title of item requested are not in system

User Response: None.

ENTER HELP OR ? FOR CODES (A)

SRCHP- Reminder of codes in system

User Response: Respond as indicated.

ILLEGAL COMMAND FOR USER (I)

SLIST- User without 'modify' privileges tried to enter a SL 'add' command. Command ignored and SLIST terminates abnormally.

User Response: None.

ENTER SL OR SHELF ADD OR LIST DDC OR LC (A)

SLIST--User entered SL/SHELF command. System requests parameters.

User Response: Enter appropriate parameters. NOTE: users who are not involved in cataloguing, serials, administration, or system maintenance have 'read' privileges only and can only use the 'list' parameter.

ENTER *A TO ALLOCATE *FOR TO SHOW FORMAT OF ENTRY (A)

SLIST- User entered "Add' system will either show format of entry or allocate space for a new entry.

User Response: Make appropriate reply. To end processing type *..

UNRECOGNIZED ACTION REQUESTED (I)

SLIST- Response to preceeding message was not *A *FOR or *. SLIST will repeat itself.

User Response: Re-enter SL/SHELF Command and reply to preceding message.

ACTION SPECIFIED NOT ADD OR LIST (E)

SLIST- User entered invalid SL/SHELF command. SLIST terminated abnormally.

User Response: Enter SL/SHELF command specifying ADD or LIST.

CLASSIFICATION SYSTEM NOT DDC OR LC (E)

SLIST- In a SL/SHELF command the second parameter was not DDC or LC. SLIST terminated abnormally.

User Response: Reenter SL/SHELF command specifying DDC or LC.

ENTER SERIAL TO ADD A SERIAL (A)

ALLOCATE- Prompt for type of catalog entry desired.

User Response: Reply as indicated in message.

ENTRY HAS BEEN CREATED (I)

ALLOCATE- A new entry has been added to the MCF.

User Response: None.

****ENTER * TO TERMINATE PROCESING*** (A)

ALLOCATE- Entry processing completed.

User Response: Enter * to terminate processing; any single character to continue.

ALLOCATE PROCESSING TERMINATED BY USER (I)

ALLOCATE- User responded with an * to previous message.

User Response: None.

ENTER BOOK FOR BOOK FORMAT SERIAL FOR SERIAL FORMAT (A)

FORMAT- Request for type of entry.

User Response: Respond as indicated. Allocate facilities for books not currently available.

****ENTER BOOK TO ADD A BOOK SERIAL TO ADD A SERIAL*** (A)

FILLER- request to add an entry to catalog.

User Response: Reply serial. Reply of book will cause processing to terminate.

****MATERIAL NOT ADDED TO CATALOG. REENTER OPTION*** (A)

FILLER- User specified book in response to previous message.

User Response: Enter serial to message above when reissued.

MATERIAL ADDED TO CATALOG (I)

FILLER- A newly created catalog entry has been added to the catalog.

User Response: None.

SYSTEM TERMINATED AFTER DUMP (T)

BRL3- Errors were detected during system operation. Data is dumped to the printer and a PL/1 dump is taken. The system then terminates.

User Response: None.

ENDFILE WHILE FLUSHING JOB (I)

BRL3- When using the batch mode to check out the program endfile was detected. System terminates.

User Response: None.

NO MORE JOBS (I)

BRL3- When using the batch mode to test program a logoff control card was detected. System terminates.

User Response: None.

JOB FLUSHED BY SYSTEM USER NOT LOGGED ON (I)

BRL3- When using the batch mode to test the program the rest of a job is flushed. System reads next card.

User Response: None.

***SESSION ENDED mmddyy hhmmmsttt *** (I)

CONNECT TIME xxxxxxxxx UNITS

NLOGOFF- User has logged off BRL3 on the indicated date and time using the amount of time shown. System updates accounting records.

User Response: None.

*** ENTER UPDATE OPTIONS A C D OR R***

LOGON-- response to request to update users.

User Response: enter A to add A new user

C to change an entry for a user

D to delete a user (name must be specified)

R to end processing and print user directory.

:

LOGON- Update prompt character. (A)

User Response: Enter an option or command information requested.

INVALID UPDATE OPTION option* (I)

LOGON- The option specified was not A C D or R.

User Response: Respecify a valid option.

ENTER 30 character name (A)

LOGON- Prompt for name of new user.

User Response: respond as indicated.

ENT[illegible]ARACTER ID (A)

LOGON-- Prompt for userid.

User Response: REply as indicated.

ENTER JOB TITLE (A)

LOGON- Prompt for job title (implementation defined).

User Reply: respond as indicated.

ENTER 40 character PASSWORD (A)

LOGON- Prompt for user password.

User Reply: Respond as indicated.

NAME=name ID=id TITLE=title PASSWORD=password (I)

USER AUTHORIZED TO USE SYSTEM ON DATE mmddyy

LOGON- User with listed attributes added to system on date listed.

User Response: None.

FOR THE FOLLOWING MESSAGES A CHARACTER STRING OF THE FORM LISTED IN THE SECOND PRECEEDING MESSAGE IS ASSUMED. LENGTH 116 characters.

NAME MISSING ENTRY NOT CHANGED   (I)

LOGON- A character string specification for a user whose entry is to be changed had no name keyword specified.

User Response: Reenter the character string with a name specified.

ENTER NAME TO BE DELETED.   (I)

LOGON- Prompt for name of user to be deleted from system.

User Response: Enter a user name (must already be in system)

USER   REMOVED FROM SYSTEM ON DATE mmddyy

LOGON=the specified user has been removed from the system.

User Response: None.

LIST OF AUTHORIZED USERS ON DATE mmddyy

NAME ID TITLE PASSWORD TIMUSER

LOGON=Response to 'r' command is to list the number of authorized users and their attributes, and return.

User Response: None.

TOTAL NUMBER OF AUTHORIZED USERS nnn

LOGON- lists number on filled entries in user directory.

User Response: None.

+

ENTER2-Prompt character.

User Response: Reply as indicated in accompanying messages.

USER RETURN FROM ATTACH

ATTACH-User entered R command.

User Response: None.

CORRECTIONS AND AMENDMENTS

AMENDMENTS:

ENTER C TO COMPILE E TO EXECUTE CPY TO COPY R TO RETURN

ATTACH- Multiple items may be translated in one invokation of attach. Use R to return after end of processing.

User Response: Respond as indicated.

*** ENTER DISC FOR DISC KBD FOR KBD***

ATTACH-entry of a null line causes KBD to be default input file.

User Response: Respond as indicated or carriage return.

CORRECTIONS:

LOGON-statement 144. For (6) read A(6).

EDITR-Statements 21 and 62 should immediately follow statement 80.

READER4-Statement 76 should be deleted.

Statements 119-120 should follow statement 78.

A'* process;' statement should precede statement 79.

A 'dcl messag entry(bin fixed(31)) external;' statement should follow statement 17.

EDITOR-"call cycle;" statements should follow statements 219, 251, 276.

'ic=0' and 'call teach' should follow statement 21.

'pagel' should read 'do;' in statement 35. 'call cycle;' and 'end;' should follow statement 36.

COORDP- is being modified and is not available in this release.

ANY ITEMS APPEARING IN THIS DOCUMENT THAT DO NOT APPEAR IN THE LISTINGS ISSUED HAVE BEEN ADDED TO THE BACK-UP COPY OF THE CODE, AND THE DOCUMENT (SECTION III) IS TO BE CONSIDERED FOR PLANNING PURPOSES ONLY.

SYSTEM SUPPORT RESTRICTION. MULTITASKING DOES NOT RUN UNDER CMS. AN OS VIRTUAL MACHINE IS REQUIRED. DATA AREAS ARE BEING REFORMATTED FOR CMS AND TSO.

The following information about files and device assignments is for the benefit of those who wish to use the BRAILLE3 translation system at their own installations.

OPERATING ENVIRONMENT. The Braille translation system is designed to operate in a multiprogramming, time-sharing environment. The following system facilities are required:

An operating system supporting time-sharing, i.e., OS/MVT with TSO, OS/VS2 with TSO, or VM/370.

System programs:

- An assembler.
- Either the Optimizing or F Level PL/1 compiler, multitasking should be supported.
- A COBOL compiler.
- System Utilities-IEBGENER.

Terminals: Either CRT or hard copy terminals can be used.

Printer: 1403 modified as described in Table 1-3 or as described in the DOTSYS III manual.

Other programs:

- A copy of DOTSYS III and its standard tables should be available.

GENERAL MODE OF OPERATION. BRAILLE3 is composed of the following tasks:

BRL3-Main program-logging on of users, calling processors.

EDITOR- Tutorial program teaching text editing codes.

CATALOG- Database creation, modification, searching and maintenance.

IDOTPAR-Linkage between PL/1 and COBOL compiler and Linkage Editor.

Linkage between PL/1 and DOTSYS III

Linkage between PL/1 and IEBGENER.

HEBREW- Hebrew Braille translator.

Operation of the various subtasks is through use of commands for BRL3 and subcommands for all subtasks except the Hebrew Braille translator. Commands, messages, and module summaries are described in the previous two subsections of this section.

Batch mode JCL is as described in the attached listings. Note should be made of the fact that datasets used during the dynamic execution of the COBOL compiler, the Linkage Editor and the IEBGENER system utility should not have conflicting DDNAMES for datasets appearing in several steps, e.g., SYSIN.

FILES. The following files are used by the various programs. Files used by the PL/1 compile step are standard. Files used by the two assemblies are standard. The SYSLIN dataset for the MODS in-stream procedure is a PDS.

In the LKEDGO procedure, the DD statement for PLITASK must precede the one for PLIBASE for the proper modules to be selected from the Multitasking versions of the BL/1 library modules.

Additional files are as follows: SYSPRINT assigned to SYSOUT, LRECL 133, may be blocked-for use by Hebrew Braille translator and CATALOG, also with LRECL of 121 may be blocked-for use of IEBGENER, and IKFCBLOO.

KBD, with characteristics of SYSIN, used by all PL/1 modules except CATALOG.

AF- sequential, used by CATALOG.

MCF-sequential, used by CATALOG.

DOCS-Indexed on entry number used by IDOTPAR.

SYSUDUMP and PLIDUMP-dump datasets, should be as listed in JCL.

CONTROL-Alternate DDNAME for SYSIN used by IEBGENER.

GETDATA1-Alternate DDNAME for SYSUT1 used by IEBGENER.

TEMO-Alternate DDNAME for SYSUT2 used by IEBGENER.

CARDIN, used by IDOTPAR and IEBGENER.

COBOLIN alternate DDNAME for SYSIN.

Q Linkage editor control statements, concatenated with COBOLIN.

All other DD statements are as indicated in the attached JCL.

NOTE: Output from DOTSYS should not go to terminal or printer, it should be stored in a PDS on disc.

MODULE ATTRIBUTES. All modules are eeentrant, and serially reusable.

PROGRAM DISTRIBUTION. The system, with the exception of DOTSYS will be available at a later date.

The use of the system utility IEBGENER to prepare the input data for DOTSYS III is as described in the JCL on the DOTSYS III listing. Please note that the tables, which are the second of the four files on the tape, are the input to the first step using IEBGENER. The second step processes the text to be translated whether it is included on cards, or is a file on disc. DOTSYS should not be run if there are errors in data preparation, as data exception errors may occur. For offline conversion, the file names are those used at your installation. On line, the dataset containing the tables is called TEMP, and the dataset containing the text is called CARDIN. This dataset also contains the control cards, which precede the text. These datasets are predefined when the CPY command is used on line.

FOOTNOTES

[1] "Computer Speeds Braille Translation Opening New Vistas for Blind", New York Times, February 1, 1972, p. 24, col. 4.

[2] Keith R. London, Documentation Standards, (rev. ed; Philadelphia: Auerbach, 1974), p. 1-253.

[3] Robert C. Gammill, "Braille Translation by Computer, 10/63", Report 9211-1, (Cambridge, Mass.: MIT, 1962), p. 1-30.

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J. K. Millen, "Finite-State Syntax-Directed Braille Translation", Report MTR-1829, (Bedford, Mass.: MITRE Corp., 1970), 1 fiche.

W. Reid Gerhart, J. K. Millen, and Joseph Sullivan, "DOTSYS III, A Portable Program for Grade II Braille Translation", Report MTR-2119, (Bedford, Mass.: MITRE Corp., 1971), 3 fiche.

These are the most important program references. The manual for DOTSYS III has been revised, but the new features have not been included in the demonstration at the present time.

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[6] Correspondence from Mr. Lee Brown.

[7] IBM Corp., for information on price of disc pack

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[9] Interview, Dr. John Gill, AFB, June 8, 1976.

[10] *Ibid.*, Dr. J. Gill.

[11] Interview, Sal Guarnieri, New York School of Printing, July 14, 1976.

[12] Letter, R. A. J. Gildea, June 15, 1976.

[13] *Ibid.*

[14] Interview, Bill Raider, National Braille Press, Boston, Mass., June 7, 1976.

[15] See Table A-2.

[16] G. P. Staack, *A Study of Braille Code Revision*, (M.S. Thesis, MIT, 1962), p. 74.

[17] H. W. Axford, "Proceedings of LARC Computer Based Unit-Cost Studies Institute, (Tempe, Arizona: The Association, 1972), p. 68-89.

[18] Virginia N. Cesario, "City College Library Annual Report 1974-1975", (New York: CCNY, 1975), p. 1-40 and appendices.

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[20] City of New York, Board of Higher Education. *CUNY Data Book Part 'c' Actual Enrollment and Credits*, (New York: BHE, 1975), Fall 1974, p. 64-67.

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----, "Circulation", (Washington: DEPH, 1975), 4 p. Mimeographed.

[23] Office of Management and Budget, *The Budget of the United States Government*, 1976, (Washington: GPO, 1976), Appendix, pp. 28-29, 35.

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[25] American Foundation for the Blind, "Facts About Blindness", (New York: AFB, 1975), pp. 5-6.

[26] Richard Evenson, *Analysis of LC Braille Reader Survey*, (Washington: GPO, 1974), 1 fiche. ED 093-324.

[27] Division for the Blind and Physically Handicapped, "Reference Circular-Magazines; Large Print, Cassette, Open-Reel, Braille and Moon Type", (Washington: GPO, June 1973), 26p. Also see Table 2-4.

[28] Louis H. Goldish, Braille in the United States: Its Production and Use- and Use, (Thesis, MS, MIT, 1967), pp. 10, 14.

[29] American Foundation for the Blind, op.cit. pp. 5-6.

[30] Interview, Alfred Hagle, DBPH, April 12, 1976.

[31] Gill, op. cit.

[32] Ibid.

[33] Interview, Jascha Lavey, Associate Director, RFB, March 11, 1976.

[34] Ibid.

[35] International Business Machines Corp., DP Sales Manual, (White Plains, N. Y.: IBM, 1976), restricted document, page reference not available.

[36] Internation Business Machines Corp., Model 145 Fact Folder, G5202398-3-, (4th ed.; White Plains: IBM, April, 1973), pp. 1-59.

[37] New York State Public Utilities Commission, "800" Tariff-Telephone, (Albany: The Commission, 1976), 2v.

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[39] Interview, Mr. Davis, State Board of Education and Services for the Blind, Wethersville, Conn., June 8, 1976. (State Rehabilitation Agency for the Blind in Connecticut).

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[42] *Ibid*, p. 3.

[43] *Ibid*, p. 6.

[44] Interview, Richard Evenson, Program Analyst, DBPH, June 18, 1976, by phone.

[45] Davis, *op*. *cit*.

[46] Interview, Mike Coyle, Library for the Blind, Free Library of Philadelphia, June 1, 1976.

[47] Hagle, *op*. *cit*.

[48] Interview, Mr. Cramer, Danish Society for the Blind, Copenhagen, February 2, 1976.

[49] Interview, Harry Friedman, Howe Press, Boston, June 6, 1976.

[50] Interview, George Dalrymple, Sensory Aids Evaluation and Development Center, MIT, November 2, 1975.

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[52] BHE, *op*. *cit*.

[53] Davis, *op*. *cit*.

[54] Letter from Henry McNair, Rehabilitation Counselor.

[55] BHE, *op*. *cit*.

[56] Evenson, Braille Reader Survey..., p. Table 14.

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[60] Interview, Copyright Office, June 2, 1976.

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[63] Ibid, Sec. 710.

[64] Ibid, Sec. 118.

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[66] Interview, B. Nugent, Library for the Blind and Physically Handicapped, New York, January, 1976.

[67] Interview, Sally Campbell, Library for the Blind and Physically Handicapped, May 18, 1976.

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[70] Redmond, op. cit.

[71] Evenson, Interview, op. cit.

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[73] Friedman, op. cit.

[74] Gill, op. cit.

[75] Gill, ibid.

[76] Ibid.

[77] Gildea, op. cit.

[78] Interview, Anthony Kostreba, Serials Division, Library of Congress, June 2, 1976.

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[97] Gill, op. cit.

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[99] Gill, op. cit.

[100] Dalrymple, op. cit.

[101] Gill, op. cit.

[102] Coyle, op. cit.

[103] Raider, op. cit.

[104] Leavey, op. cit.

[105] Friedman, op. cit.

[106] Coyle, op. cit.

[107] TSI Incorporated, OPTACON brochure, p. 8.

[108] Marcy, op. cit.

[109] Staack, op, cit., p. 74.

[110] Carroll, op. cit., p. 48-49.

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A-1

The information on the following pages is referred to in the main body of the text, but is not directly related to the text, and it is included here for reference.

The following information from Staack's thesis is used to estimate the amount of space saved by the 189 English braille contractions; it is an estimate of how many characters the braille text will occupy.

Table A-1

Estimating amount of Text in Braille

Number of letters per word	4.5
Number of characters saved per 100,000 words	116,320[109]
Percent of characters saved per 450,000 characters	25.85%
500,000 characters	23,26%

Source: Staack, A Study of Braille Code Revision, p. 74.

Table A-2

Standards for Press Braille

4:25 Pages
- 4:25:2 Pages of magazines do not exceed 13 1/2 inches in height and 11 inches in width...
- 4:25:3 There are 36 or 38 cells per line in press-made books...
- 4:25:4 There are no more than 25 lines per page in general literature and textbooks...[110]

Source: Carrol, T., Standards for Reproduction of Reading Materials for the Blind and Physically Handicapped, p. 48-49.

The information in Table A-2 is used to calculate the actual number of braille pages that the text will occupy. Use the figure obtained after applying the correction in Table A-1.

Table A-3

USE OF A LIBRARY OF TAPE RECORDED BOOKS

Total number of Borrowers 10995 includes 4321 College Students

Hours of reading circulated- 1274839 on 5" 17/9 ips 4 track mono tapes- 6 hrs. each tape.

Titles 30621

New Titles recorded at borrower request 4290

Hours of reading per borrower 116

Titles circulated per borrower 2.78
College Student7.09

Cost of providing borrower with service

New Title - imputed cost of recording services		$619.15
studio management		113.22
Total for recording new title		732.37
Cost of Reproducing a title-Production		19.04
Cost of Circulation - per title		9.11
Central Library	$2.16	
Circulation	6.95	
Supporting Services		26.02
Unit Coordination		1.92
Administration- Hq.		11.00
Fund Raising		11.47
Public Service and Information		1.63
Total cost for existing title		54.17
Total cost for New Title		113.22

Table A-3

Cost of providing borrower with service

All borrowers	$150.59
College Student Borrowers	$383.52

Note: No time breakdown for tasks available.

USE OF A LIBRARY OF TAPE RECORDED BOOKS

Note: All costs assumed fixed.

All books recorded are individually requested and may also be sent in installments from units recording them. College student borrowers are approximately 95% of all blind college students nationwide.

New York City figures not available.

Source: RFB 1974-1975 Annual Report

Table A-4

OPTACON: DIRECT PRINT TO BRAILLE CONVERSION SYSTEMS:

EQUIPMENT PRICES: SPEED OF READING

Model*	Price		Service Agreement
R1B	$ 2895		1st year $100; 2nd year $200
R1C	2995		1st year $100; 2nd year $200
Y1A	2950		
(Also may be rented -		$150 monthly	
V1A	675		1st year $ 20; 2nd year $ 40
T2A	55		
T2B			
Accessories			
F1A CRT Lens	145		
F2B Calculator	95		
F3A Typewriter	195		
F2B w/Calculator	135		
Camera case	5		
M1B Repeater Cable	35		

*Training manuals and courses extra

*...slower than braille, a reading speed of about 25 to 30 wpm possible after approximately 50 hours training. 8 currently using Optacon, were taught on the job; 3 are programmers. Children may be able to learn at a faster rate..."

Source: OPTACON Brochure for prices
R. Marcy, State Board of Education for the Blind,
Wethersville, CT for comment on speed
(he is an Optacon instructor)

Note: This machine gives a raised image of print on a sensor composed of vibrating reeds.

Table A-5

CHARACTERISTICS OF BLIND POPULATION - ONTARIO, CANADA:

AGE AND PROFESSIONAL DISTRIBUTION*,**

A: Age:

0-5	19
6-15	101
16-19	57
20-29	167
30-39	103
40-49	126
50-64	273
65-80	298
80-	182

*These are 1974 eata.

**Only those with no vision or light perception are included. Figures represent cases known to CNIB as of 1974.

B: Professional Distribution:

Administrators, Managers, Supervisors	17
Art	
Business owners	39
Clergy	4
Computer Programmers	21
Economists	4
Education-all levels	23
Engineers and Technicians	6
Horticulture	1
Insurance, Real Estate	7
Investments and Securities	2
Journalists, writers	4
Lawyers	3
Librarians	3
Medical/Paramedical-all specialties	23
Musicians, Music Teachers	32
Personnel	1
Politics	2
Public Relations	4

Table A-5 (Continued)

Research	
Radio and TV	4
General Sales	1
Social Services-Child care and Social work	24
Translators	1

(CNIB positions excluded)

Source: Letter from Dave Brown, CNIB.

SUGGESTED QUESTIONNAIRE FOR FURTHER STUDY

Please answer all questions. If you don't know how to respond answer "don't know." You should not sign the paper. This questionnaire is to be used to find out the characteristics of blind braille-using professionals in order to provide more extensive professional journals and related materials. Your cooperation is sincerely appreciated. Use separate sheet if needed. Replies may be Brailled.

1. Do you read Braille ________________ (if no, do not complete rest of questionnaire).

2. How do you obtain professional literature now

   ________Readers

   ________Tapes

   ________Braille

   ________Other

   (Indicate relative percentage for each)

3. Please list any professional societies that you are affiliated with.

4. Please list those journals and abstracting services that you use frequently. Indicate if any of them are in braille.

5. If you would like to have more professional literature available in braille, please list either the titles or types of materials you would like to have more of.

6. Indicate your profession. (If in doubt as to the status of your work as professional, consult a standard source such as the Dictionary of Occupational Titles.

7. Indicate any other comments or information which you consider appropriate.